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THE OFFICIAL

GOOD ROADS YEAR BOOK

OF THE

UNITED STATES

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GOOD ROADS YEAR BOOK

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PREFACE

The Official Good Roads Year Book, of which this volume is the second annual issue, is one of the undertakings of the American Highway Association, organized in November, 1910, "to harmonize and correlate all efforts for the improvement of the public roads, to the end that adequate and efficient systems of road construction, administration and maintenance may be adopted in all of the States." In organizing its work it gathered together a large amount of information concerning all features of road legislation, construction and maintenance, and so many inquiries were sent to the Association for such information that it was decided to publish an annual year book giving a summary of the data relating to the subjects about which inquiries were most frequent.

The engineering features of road construction and maintenance are the subjects of so many text-books, as well as special reports by the Office of Public Roads of the United States Department of Agriculture and many State boards and officials, that it has seemed wise to devote comparatively little space to these subjects. Nevertheless enough is given to enable the legislator, county commissioner or non-technical reader to understand any special reports which may come before him and to grasp the main features of the work. For more information on these technical subjects the reader should consult some of the works listed in the bibliographies printed in this volume.

The section of the Year Book devoted to bond issues is not entirely complete, for the collection of such statistics is an extremely difficult task on account of the practice in many counties of issuing bonds for several purposes combined, so that the proportion spent for roads, culverts and bridges is obtained only after prolonged correspondence and even then is not always accurate. Furthermore a considerable amount of road construction is carried on by funds raised by direct taxation, and this fact makes the total bonded indebtedness for highways an incomplete index of the amount of money being spent for road improvements. The amount of money used for the purpose annually is so great that every means of securing accurate records of it is employed by the Association; the results of this work to date are by no means so good as those which longer experience in obtaining the statistics will afford, yet it is believed that they will prove very valuable to a wide circle of readers.

No section of the book represents more work than that in which the legislation of the States is summarized. The interest in the subject is widespread and relates not only to the legislation of particular States but also to the legislation on special topics in all States. For this reason an attempt has been made in this issue of the YEAR BOOK to present the information under several heads so as to enable the reader to secure what he wishes with as little search as possible.

The American Highway Association desires to make the annual issues of the YEAR BOOK of service to all interested in the improvement of our country roads, and will appreciate suggestions concerning new features and changes in the old features of this publication. These should be sent to the secretary of the Association, whose offices are in the Colorado Building, Washington, D. C.

HISTORY OF ROAD BUILDING

Ancient Road Builders

When or where the first road was built is not known. Herodotus speaks of a great Egyptian road on which King Cheops employed 100,000 men for a period of ten years. According to the historian, this road was built of massive stone blocks 10 feet deep, and lined on both sides with temples, mausoleums, porticoes and statues. The streets of Babylon are said to have been paved as early as 2000 B.C., and several well surfaced roads radiated to neighboring cities. Carthage, before its fall, was the center of a highly developed road system. The ancient Peruvians had a wonderful system of national roads connecting all the principal parts of their empire.

Bridges were also built by the ancients at a very early date. The Euphrates, at Babylon, was crossed by a stone bridge prior to 2000 B.C., and it is known that the Chinese built bridges as public works as early as 2900 B.C.

The Romans as Road Builders

The first definite and fully authentic information concerning the systematic construction and maintenance of permanent roads comes to us from the Romans. It is generally understood that the Romans learned the art of road building from the Carthagenians. However, the construction of their first great road was as perfect as that of any of their later ones.

The first of the great Roman roads was from Rome to Capua, a distance of 142 Italian miles, and was begun by Appius Claudius, about 312 B.C. It was known as the Appian Way or "Queen of Roads." This road was later extended to Brundisium, a total of 360 miles, and was probably completed by Julius Cæsar. About 220 B.C. the Flaminian Way was built. It crossed the river Nar on a stone bridge which had a central span of 150 feet with a rise of 100 feet. When Rome reached the height of her glory, under the reign of Augustus, no less than 29 great military roads radiated from the city. These roads extended to every part of the vast empire and are estimated to have had a total length of 50,000 miles.

The Roman construction was in general extremely massive. The Appian Way is said to have been in good repair 800 years after it was built. On a carefully prepared earth subgrade was placed four successive courses or layers; the statumen or foundation course, the rudus or second course, the nucleus or third course, and the pavimentum or wearing surface. The top and bottom courses consisted in general of large flat stones, while the two intervening courses were built of smaller stone or other suitable material laid in lime mortar.

With the fall of the Roman Empire the roads were neglected and gradually fell into decay, so that today but little more than a trace remains of these splendid achievements.

The French as Road Builders

The Romans built and improved many roads throughout what is now France, but later these fell into decay. It was not until the beginning of the seventeenth century that interest in road building revived to any considerable extent. In 1661 Colbert was appointed comptroller of finance, and during his ministry 15,000 miles of hard road were built by means of enforced peasant labor under the old feudal institution of the corvee. The corvee prevailed with the utmost rigor until 1774, when Turgot abolished some of its most objectionable features. It was finally abolished in 1787.

The present road system of France was really founded by Napoleon. He adopted very largely the innovations instituted by Tresaguet, and perfected a splendid administrative system.

The most striking feature of the French road system is the skilled supervision provided in every grade of road work and in every unit of the administrative organization. The basis of the French system is the School of Roads and Bridges, one of the finest technical schools in the world, and maintained entirely at the expense of the National government. From the graduates of this school are chosen the highway engineers who are entrusted with the construction and maintenance of the roads of France.

The total mileage of all roads in France is about 355,000 miles. Of these 23,820 miles are classed as national roads and are, therefore, the property of the State. The remaining roads are divided into departmental and vincinal routes, for which the state only makes occasional appropriations for construction and which are invariably maintained by the local governments.

Toll Roads

The earliest mention we have of the exaction of tolls is probably that given by Strabo, on the roads leading from Babylon to Syria. It is not until 1346 that we find the toll system definitely adopted as a means of raising revenue for road maintenance and repair. In that year Edward III of England granted a commission to the Master of the Hospital of St. Giles and John Holborn to collect tolls on vehicles passing on the road leading from the Hospital of St. Giles to the Old Temple, London, and also on an adjoining road called the Portal. But it was not until the latter half of the eighteenth century and first part of the nineteenth century that this method of raising road revenues reached its greatest popularity. This took the form of a regular flood of turnpike acts passed by Parliament. It is estimated that in 1838 no less than 1100 turnpike trusts were in existence throughout the kingdom. The cost of collecting the tolls, however, often nearly equaled the income, leaving little or nothing for maintenance. In 1871 the census showed that 5000 persons in England and Scotland were engaged in merely collecting tolls. In 1857 Ireland freed herself from toll gates, and in 1878 Parliament passed an act abolishing tolls in England.

Tolls on vehicles were never popular in France and while introduced somewhat at different periods, never became general.

In the United States the first toll road was the Lancaster Pike, between Philadelphia and Lancaster, Pennsylvania, a distance of 62½ miles, the construction of which was authorized in 1792. Bridges were also constructed by private capital and tolls charged for crossing. The turnpike improvements continued to expand rapidly until in 1828 the length of chartered turnpikes in Pennsylvania amounted to 3110 miles, of which 2380 miles were completed at a cost of $8,431,059.50. It is stated that none of these roads had, up to that time, yielded sufficient dividends to remunerate their proprietors. By 1811 over 317 turnpikes had been chartered in New York and the New England States, having a combined length of 4500 miles and a capital of over $7,500,000. With the introduction of the railroad, interest in turnpike building practically ceased, and today there remain in the United States very few roads on which toll is collected on passing traffic.

The Cumberland Road.—Popular tradition generally attributes the conception of the National Road to Henry Clay. However, Albert Gallatin seems to have made the first definite suggestion of this road, while Henry Clay soon became its ablest champion.

By an act of Congress approved by President Jefferson on March 29, 1806, $30,000 was appropriated toward the survey and construction of a road leading from a point on the Potomac at or near Cumberland, Maryland, to the Ohio River at or near a point opposite the town of Steubenville. This act provided that the road be cleared to a width of four rods, and that no grade exceed five degrees. An act of Congress, May 15, 1820, provided $10,000 for laying out a road from Wheeling, Virginia, to the Mississippi

River near St. Louis. This was really to be a continuation of the Cumberland or National Road. The road was to be laid out 80 feet wide.

In 1835 arrangements were completed whereby the portion of the National Road between Cumberland and Wheeling was taken over by the respective States and operated as a toll road. Appropriations, however, were continued on the portion west of the Ohio River until May 25, 1838, when the last direct appropriation for construction was made. The total amount appropriated by Congress was $6,824,919.33.

The length of the line first opened was 130 miles and the cost of construction $1,700,000. The first stage coach bearing the United States mail from Cumberland to Wheeling passed over the road on August 1, 1818.

West of the Ohio, the road led through Columbus, Indianapolis and Terre Haute. The road was surfaced to Columbus, but west of that point it was only surfaced in places; and about 1850 most of the road was absorbed by local turnpike companies. Before the road was completed beyond the western boundary of the State of Indiana, the steam railway had become the chief agency of transportation and the National Road came to an end on the prairies of Illinois.

Great Road Builders

Tresaguet.—Pierre-Marie Tresaguet was born at Nevers, in 1716, died in Paris, 1796. While he was a great engineer and made many improvements for river navigation, posterity knows him only as a great road builder. Tresaguet may well be called the father of modern road building. In 1775, when MacAdam was but twenty-one years of age, Tresaguet presented a report to the Assembly of Bridges and Highways which amounted in reality to a treatise on road construction. The real value of Tresaguet's work was; first, in recognizing the need of constant maintenance and devising a means for carrying it out; second, improving the methods of construction and reducing the cost. The prevailing form of stone roads up to this time consisted of a transversely level stone pavement on which was placed broken stone to the depth of 12 inches at the sides and 18 inches at the middle. Tresaguet improved the drainage, gave a crown to the stone pavement or foundation, and reduced the depth of broken stone to a uniform thickness of 10 inches. The roads built by Tresaguet differ but little from those built by Telford in Scotland some thirty years later. While Tresaguet was not fortunate enough to leave his name to the type of road he advocated and built, he laid the foundation upon which it was possible for Napoleon to build the great system of French highways. Tresaguet laid especial emphasis on organized, continuous maintenance. He first began the organization of cantonniers, which are the very backbone of the present French system of road maintenance.

John Loudon MacAdam.—John Loudon MacAdam was born at Ayr, Scotland, September 21, 1756, and died November 26, 1836.

While MacAdam was not the inventor of the road which now bears his name, he nevertheless deserves great credit for the work he did. The broken stone road as adopted by MacAdam was used in practically the same form in several parts of Europe, though he was no doubt the first to grasp and fully explain the theory of the broken stone road without a paved foundation.

MacAdam demonstrated that stone when broken to the proper size and placed on a properly drained and graded earth foundation would so consolidate under traffic as to be thoroughly waterproof and capable of carrying the heaviest vehicles without injury. He held that the earth, in fact, sustained the load, and all that was necessary was to thoroughly drain the roadbed and protect the surface with an impervious covering.

At the death of his father in 1770, young MacAdam went to live with his uncle, a merchant in New York City. In 1783 he returned to Scotland and was shortly appointed as deputy-lieutenant for the county of Ayreshire. In performing his duties as magistrate and trustee of roads, MacAdam became impressed with the lack of scientific principles in the construction and maintenance of the roads. In 1816, he became inspector for the Bristol "Turnpike Trust" and supervised the reconstruction and repair of 178 miles of roads. In 1817 he built the first macadam roads in London, the approaches to Blackfriars and Westminster bridges. In 1823 MacAdam moved to London, where he was appointed street commissioner in 1817. Slowly the system of construction and maintenance which he advocated spread throughout the entire empire. In 1836 he returned to Scotland where he owned a house in the little town of Moffat: but he was not long permitted to enjoy his leisure, for he died the same year.

His principal writings are: *A Practical Essay on the Scientific Repair and Preservation of Public Roads*, London, 1819, and, *Remarks on Present State of Road Making*, London, 1820.

Thomas Telford.—Thomas Telford was born in Dumfriesshire, Scotland, August 9, 1757, and died September 2, 1834, and was buried in Westminster Abbey.

Thomas Telford was one of the greatest civil engineers of his time. He was one of the founders of the "Institution of Civil Engineers" and was annually elected as its president until his death. His works were recognized both at home and abroad. For the Austrian government, he built the road from Warsaw, to

Brest, while the King of Sweden conferred the order of knighthood of "Gustavus Vasa" in recognition of his services on the Gotha Canal. As some of his most notable achievements may be mentioned the following bridges: Across the Tay at Dunkeld, the Menai Straits, the Conway bridge, the Deanbridge at Edinburgh, and the Broomielaw bridge at Glasgow. Canals: Ellesmere, Caledonian, Gloucester and Berkeley, Grand Trunk, Macclesfield, Birmingham and Liverpool Junction, and the Gotha. Harbors: Pulteneytown, Aberdeen, Dundee, Dover, and the St. Katherine docks at London.

In 1803 he was appointed engineer for the construction of 920 miles of roads in the highlands of Scotland. Later, he perfected the road communication between London and Scotland and the northern towns of England. An undertaking of equal magnitude and importance with that in the highlands of Scotland was a system of roads through the more inaccessible parts of Wales.

The form of construction most generally used by Telford, and which bears his name, is very similar to that employed much earlier by Tresaguet. The foundation course on which is placed the broken stone consists of stones about 10 inches by 6 inches by 4 inches, in dimension, carefully placed by hand and keyed firmly with smaller chips. Care is taken to secure the best possible drainage. At the present time, the Telford system is more commonly employed abroad than in this country. American road builders usually only resort to the Telford system when the natural earth foundation is weak. The chief objection is generally stated as being the high first cost due to the large amount of hand labor required.

Principal Inventions

The Steam Road Roller.—The steam road roller was invented by M. Louis Lemoine, of Bordeaux, France, and a patent was granted to him by the French government in 1859. M. Lemoine's roller was first used on the road in the Bois de Boulogne in 1860. The first English patent was granted to Messrs. Clark and Batho in 1863. About 1864 a roller built under this patent was shipped to Calcutta, where it was used with great success.

The first steam roller used in England was on the roads in Hyde Park in 1866. In September 1867, the borough authorities of Liverpool purchased from Messrs. Aveling and Porter their first steam road roller, which weighed 30 tons.

The first steam roller used in the United States was imported from England in the fall of 1868. This roller was first used in the United States Arsenal grounds, Philadelphia, Pennsylvania. At the present time, the term "steam roller" is somewhat of a misnomer, as the recent developments in oil and gasoline engines have made this form of motive power practical.

The Stone Crusher.—The stone crusher was invented in 1858, by Mr. Eli Whitney Blake, of New Haven, Connecticut. Mr. Blake's crusher was used for the first time in Central Park in crushing stone for concrete. In 1859 the city of Hartford, Connecticut, purchased one of these crushers for use in the improvement of its streets and roads. This is the first application of mechanical power in the preparation of road metal.

Mr. Eli Whitney Blake was born in Westboro, Massachusetts, on the 17th of January, 1795. He was a nephew of Eli Whitney, the inventor of the cotton gin. In 1816 he graduated from Yale. For a time he studied law, but soon entered the manufacturing business. He died in 1886.

ROAD SYSTEMS OF FOREIGN COUNTRIES

Austria-Hungary

The roads in Austria-Hungary are divided into four administrative classes, namely; government roads, provincial roads (designated county roads in Hungary), district roads, and town roads (designated parish roads in Hungary). The government roads, of which there are 10,008 miles in Austria and 5600 in Hungary, are constructed and maintained at the expense of the imperial government, which has complete supervision over construction and maintenance. The provincial roads in Austria, of which there are 2288 miles, and county roads in Hungary, of which there are 17,400 miles, are constructed and maintained at the expense of the province or county, the imperial government contributing in some cases. The district roads, of which there are 39,212 miles in Austria and 8100 miles in Hungary, are constructed and maintained by the districts, except that very poor districts are aided by the province or the county. The town roads, of which there are 22,756 miles in Austria, and the parish roads, of which there are 700 miles in Hungary, are local roads and are paid for by the town or parish, the province or county occasionally aiding by grants. The total mileage of all roads in Austria was 74,265 miles in 1909, and in Hungary 31,800 miles in 1910. The average cost of maintenance in Austria is given at about $311 per mile per annum, and in Hungary $282, exclusive of bridges. In both Austria and Hungary the general government has general supervision over all roads. In Austria the road administration is under the ministry of the Interior, under which there are district engineers, each in charge of 74½ miles of road. Under each of the district engineers are three road masters,each having about 24.9 miles of road, and these in turn supervise the actual road workers or patrolmen, each of whom has about 2.9 miles of road to maintain. There are in all about 4000 men employed on the Austrian government roads. The Hungarian road system is similar and employs about 2500 men.

Denmark

The roads of Denmark are divided into main roads, of which there were 4213 miles in 1910, and local roads, of which there were 22,505 miles in 1910, or a total of 26,718 miles. The main roads are maintained at the expense of the counties, of which there are twenty-one in the kingdom, and the local roads are maintained at the expense of the parishes, which are sub-divisions of the counties. There is a general superintendent of highways who has supervision over all the highways in the kingdom. The direct supervision, however, is by the counties for main roads, and by parishes for local roads. The government does not grant money aid. The principal roads in the kingdom are maintained by a patrol system, under which each patrolman has charge of about 2½ miles of road. The cost of construction varies widely, ranging from about $1300 to about $8700 per mile, the character of construction being usually either gravel or macadam.

England and Wales

There were in 1909–10 a total of 150,908 miles of roads. The roads are divided into main roads and roads other than main roads, the mileage in 1909–10 being respectively 27,826 miles and 123,082 miles. The general government renders aid to road construction and maintenance in three ways; first, through the assignment of certain national revenues, varying in amount, to the aid of local taxation, it being optional with the local authorities as to how much of this fund is spent on roads; second, by loans through the government road board; third, by free grants through the government road board. The government does not supervise the work where it is done with current revenues, but where it is under loan or grant, the sanction of the road board must be obtained and this is generally based on plans and estimates. The assistance granted by the government through loans and grants is for the construction and maintenance of new roads or the road board itself may construct and maintain new roads. The annual cost of maintenance of main roads is given for 1909-10 as $389 per mile per annum. and the roads other than main roads $112 per mile per annum. The amount expended by local authorities in 1909-10 was $32,498,000, not including loans, which amounted to $7,916,964.

France

The roads of France aggregate 520,088 miles and are divided into the following classes: national roads 23,754 miles; department roads 9050 miles; vicinal roads, sub-divided into roads of through travel 107,065 miles, and roads of common interest 47,263 miles (the roads of these two latter classes traversing several communes or towns), ordinary vicinal, which are located within a single commune, 177,580 miles; rural roads, which are unimportant neighborhood roads 155,376 miles. It is estimated that the national roads cost $9000 per mile for construction and $346 per annum for maintenance; the department roads $7400 per mile for construction and $189 per annum for maintenance; the vicinal roads of through travel $4500 per mile for construction and $125 per annum for maintenance; the vicinal roads of common interest $3000 per mile for construction and $95 per annum for maintenance; the ordinary vicinal roads $2000 per mile for construction and $63 per annum for maintenance. The national roads are constructed and maintained entirely at the expense of the national government, which also aids by subsidies to a small extent, the vicinal roads. The departments maintain the department roads. The national government has general jurisdiction over all transportation facilities and direct supervision over the national roads, which are administered by the corps of bridges and roads in the ministry of public works. The corps of bridges and roads is divided into three divisions, of which roads and navigation form one.

The division of roads and navigation is under the direction of a counselor of state and is divided into two sections, namely; bridges and roads, and navigation. The section of bridges and roads is divided into two bureaus, one of which has entire charge of the national roads, and the other has jurisdiction over all matters relating to department roads, automobile traffic and general police regulation. The sections and bureaus and the higher field inspection are under the direction of inspectors general. Each of the inspectors general of the second class have charge of a large field division and under him engineers in chief, usually one to each department, while under these engineers in chief are ordinary engineers and under them are sub-engineers and conductors or foremen and finally the patrolmen who work directly and constantly on maintenance, each having a section of road varying in length, but averaging about 2.8 miles. There were 8560 patrolmen employed in 1909 on the national roads. The engineers for the French road service are trained in the School of Roads and Bridges at Paris and are appointed upon graduation to the lower positions and gradually advanced to positions of responsibility.

The annual expenditure on the public roads of France is about $48,000,000. The national government appropriated in 1910, $9,720,000 for the national roads. It is estimated that the total cost of the entire French road system, excluding the unimportant neighborhood roads, is upwards of $1,100,000,000.

Germany

The imperial govermnent of the German Empire takes no part in the construction or maintenance of public roads. Each state in the Empire follows its own policy in this matter.

As a general rule the roads in the various states are divided into three classes: state or provincial roads; county roads, and local roads. The state roads are generally built and maintained by the state, which maintains a corps of competent engineers. The larger states usually divide their road systems into districts, the engineers in charge of the districts reporting directly to the central office. The patrol system is quite generally followed, each patrolman having from 2 to 5 miles of road to maintain. Their compensation is from $150 to $250 per annum. At the end of thirty years service, or if sooner incapacitated, they are entitled to a pension.

Prussia takes no direct part, however, in the maintenance of roads. The state roads were turned over to the provinces in 1875 and some of the provinces in turn passed them on to the counties. The general government grants aid to the provinces by certain allowances fron the "dotation fund."

The largest class of improved roads in the German Empire is that of the county roads which are very largely maintained by local taxation. The states and provinces, however, exercise close supervision over these roads. The parish roads are purely local and are maintained and managed by the parishes, although occasionally the county and even the province aid in new construction.

There are approximately 36,000 miles of state road in Germany, of which Prussia has 20,489 miles, Bavaria 4200 miles, Saxony 2267 miles, Baden 1890 miles, Wurtembourg 1710 miles, and the smaller states the remainder. Of county roads Prussia has 38,400 miles hard surfaced, parish roads 14,598 miles hard surfaced, and private roads 1100 miles hard surfaced, or a total of 74,587 miles of improved roads, or 1 mile for each 1.8 square mile of area. Prussia expends nearly $35,000,000 a year on all roads, of which about 28 per cent is paid by the provinces, 33 per cent by the counties and 39 per cent by the parishes. Under favorable conditions the cost of construction of state roads does not often exceed $5000 per mile. In Hanover a considerable mileage of brick roads has been constructed at from $10,000 to $13,000 per mile. In the kingdom of Wurtemburg the cost of maintenance of state roads in 1910 was $400 per mile.

Italy

The roads of Italy aggregated 92,199 miles in 1910, and were divided into three classes, namely, national roads, connecting important cities and ports; connecting with roads of other countries; the Alpine and Appennine roads, and those used for military purposes, having a total mileage in 1910 of 5159 miles; the provincial roads, connecting the chief town of each province with the chief towns of other provinces and with maritime ports, having a total of 27,757 miles; communal roads, which are the roads of local interest, having a mileage of 59,283 miles. The national roads are constructed and maintained by the national government through the department of public works. The official in charge is designated as the director general of bridges and roads. The provincial roads are constructed and maintained by the provinces, while the communes or townships provide for the construction and maintenance of communal roads. The national roads are maintained by means of the patrol system, each patrolman having an average of 2½ miles of road. It is estimated that the cost of maintenance in 1909-10 was $274.70 per mile per annum for national roads, and $183.32 per mile per annum for provincial roads.

Norway

The roads of Norway aggregate 17,550 miles and consist of main roads, 6570 miles, and district roads, 10,980 miles. The national government contributes two-thirds to three-quarters of the cost of construction of main roads, while the maintenance of such roads is, with few exceptions, a local burden. The work is done under county engineers who are nominated by county councils and appointed by the national government. At the head of the whole system, however, is the national road director. It is estimated that the main roads cost about $8000 per mile.

Russia

There are 11,254 miles of post roads in Russia, of which 8326 miles are under direct government control and 2928 miles are temporarily under control of district councils with government supervision. The construction and maintenance of these government roads are partly under the ministry of ways and communications, and partly under the war department. It is estimated that the cost of construction of government roads is from $8544 to $10,874 per mile, and the maintenance from $70 to $210 per mile per annum.

Spain

There were 33,873 miles of road in Spain, in 1910, which were classified as state roads and provincial roads. State roads are constructed and maintained by the general government through the department of public works. Under this department is a director general, and under him a chief engineer for each province. The government also aids, by appropriations, maintenance of provincial roads. The patrol system is followed in the maintenance of state roads. It is estimated that the maintenance of state roads costs between $230 and $240 per mile per annum.

Sweden

There were 35,450 miles of road in Sweden, in 1907, made up of 11,850 miles of main roads and 23,600 miles of district roads. The main roads are those which unite the kingdom with other countries and connect the large cities and ports. The district roads are those of local importance. For the construction of main highways, the government pays two-thirds and the districts one-third of the cost, while on maintenance of these roads, the government pays 15 per cent of the total. The royal board of road building and water works has supervisory powers in road, railroad and harbor construction. The expenditure per mile of road, including all classes, was in 1907, $60 per mile.

Switzerland

There were in 1911, 7426 miles of road in Switzerland which were classified as federal aid canton roads built and maintained by the cantons with federal aid, 350 miles; canton roads, built and maintained by cantons, 862 miles; municipal roads built and maintained by municipalities 6214 miles. The federal government grants aid only to those four cantons whose roads are of international character, the annual aid being as follows: Uri, $15,440; Graubenden ,$38,600; Tessin, $38,600; Valais, $9650.

The department of public works in each canton supervises road construction and maintenance, while the upper supervision of the federal government is carried on through the department of the interior. Construction of roads in Switzerland is very expensive on account of the fact that they are practically all mountain roads.

NATIONAL AID TO ROAD IMPROVEMENT

In the post office appropriation act approved August 24, 1912, a provision was included reading as follows:

> That a joint committee shall be appointed, composed of five members of the Senate, to be designated by the chairman of the Senate Committee on post offices and post roads, and five members of the House to be designated by the chairman of the House committee on the post office and post roads, to make inquiry into the subject of federal aid in the construction of post roads and report at the earliest practicable date, and for this purpose they are authorized by subcommittee or otherwise to sit during the sessions or recess of Congress, at such times and places as they may deem advisable, to send for persons and papers, to administer oaths, to summons and compel the attendance of witnesses, and to employ such clerical, expert and stenographic assistance as shall be necessary, and to pay the necessary expenses of such inquiry there is hereby appropriated out of any money in the treasury not otherwise appropriated the sum of $25,000, to be paid out upon the audit and order of the chairman or acting chairman of said committee.

The president of the Senate appointed on August 24, 1912, on this joint committee Senators Jonathan Bourne, Jr., of Oregon; Boies Penrose, of Pennsylvania; Asle J. Gronna, of North Dakota; Claude A. Swanson, of Virginia; and Lee S. Overman, of North Carolina. The speaker of the House on the same day appointed on the same committee Representatives Dorsey W. Shackleford, of Missouri; Gordon Lee, of Georgia; Daniel J. McGillicuddy, of Maine; Martin B. Madden, of Illinois; and Richard W. Austin, of Tennessee.

The committee is making an exhaustive study of the subject and has arranged for Mr. J. E. Pennybacker, secretary of the American Highway Association, to serve as statistician during the temporary period in which the data will be collected and compiled. A preliminary report was issued by the committee on January 14, 1913, containing data from foreign countries and from the various states. The directors of the American Highway Association were invited to confer with the committee on January 21 and at the conference Messrs. W. W. Finley, president of the Southern Railway and vice-president of the Association; Alfred Noble, past president of the American Society of Civil Engineers, a member of the executive committee, and George W. Cooley, State highway commissioner, of Minnesota, a director of the Association, gave their views and advice at some length.

To afford a more complete understanding of the legislative situation in Congress with reference to this subject a summary of bills introduced in the sixty-second Congress is given as follows:

Senate

August 10, 1911 (1st Session): Mr. Cullom—S-3197. To establish a commission; to create a national interstate highway system; to effect preliminary surveys of seven national interstate highways and the establishment of said highways, etc.

April 20, 1911 (1st Session): Mr. Swanson—S-1388. To provide for the construction, maintenance and improvement of post roads and rural delivery routes through the coöperation and joint action of the national government and the several States in which such post roads or rural delivery routes may be established.

May, 1 1911 (1st Session): Mr. Swanson—S-1891. (Same title as foregoing).

April 11, 1912 (2d Session): Mr. Owen—S-6271. Authorizing the construction of a national highway from the Canadian border line immediately south of Winnipeg, Canada, through the States of North Dakota, South Dakota, and others to Galveston, Texas.

May 9, 1912 (2d Session): Mr. Gore—Amendment to H. R. 21279, post office appropriation bill, creating a joint commission on public highways, etc.

January 7, 1913 (3d Session): Mr. Swanson—S-8003. To provide for the construction, maintenance, and improvement of post roads and rural delivery routes through the coöperation and joint action of the national government and the several States, etc.

House

December 4, 1911 (2d Session): Mr. Griest—H. R. 14128. To provide for national aid in the improvement of the public roads.

December 6, 1911 (2d Session): Mr. Heflin,—H. R. 14685. To appropriate $500,000 for the purpose of carrying on demonstration work on public roads in the United States.

December 12, 1911 (2d Session): Mr. Russell—H. R. 15472. Providing appropriation of money for construction of State and interstate highways, etc.

December 16, 1911 (2d Session): Mr. McKellar—H. R. 16096. To create a national post commission, to define its powers, and to fix its duties.

December 16, 1911 (2d Session): Mr. Prouty—H. R. 16097. To provide for federal aid for the construction of post roads and making an appropriation therefor, and the licensing of automobiles used in interstate travel.

December 19, 1911 (2d Session): Mr. Candler—H. R. 16283. To distribute the surplus in the treasury of the United States to the several States, Territories, and the District of Columbia for the purpose of improving the roads therein.

December 19, 1911 (2d Session): Mr. Candler—H. R. 16284. To provide for the construction, maintenance and improvement of public roads and rural delivery routes through the coöperation and joint action of the national government and the several States or counties in which such public roads or rural delivery routes may be established.

December 20, 1911 (2d Session): Mr. Oldfield—H. R. 16443. To provide for the construction, maintenance, etc.(same heading as foregoing).

January 5, 1912 (2d Session): Mr. Anderson—H. R. 17013. To establish in the department of agriculture a bureau to be known as the bureau of public highways and to provide for national aid in the improvement of the public roads.

January 5, 1912 (2d Session): Mr. Shackleford—H. R. 17018. Providing that the United States shall in certain cases make compensation for use of roads for carrying free rural-delivery mail.

January 13, 1912 (2d Session): Mr. Taggart—H. R. 17821. To aid in the construction and improvement of public highways.

January 15, 1912 (2d Session): Mr. Borland—H. R. 17919. To provide a national ocean-to-ocean highway over the pioneer trails of the nation, etc.

January 15, 1912 (2d Session): Mr. Hobson—H. R. 17928. To promote the harmonious coördinated development of the highways of the United States, with a minimum waste, through the creation of the general highway board and of the general highway foundation.

January 15, 1912 (2d Session): Mr. Francis—H. R. 17931. To provide for the reconstruction and maintenance of the old national road leading from Cumberland, Maryland, to St. Louis, Missouri, and to extend the same, making it a grand model midland national highway.

January 17, 1912 (2d Session): Mr. Bell of Georgia—H. R. 18162. To promote the construction of good roads and the efficiency of the postal service in the States and Territories of the United States.

January 19, 1912 (2d Session:) Mr. Byrnes of South Carolina. To provide for an experiment in the improvement of post roads by the secretary of agriculture in coöperation with the postmaster general, and for other purposes.

January 22, 1912 (2d Session): Mr. McGuire of Oklahoma—H. R. 18491. To provide for the coöperation and joint action of the national government and the several States in the construction, maintenance, and improvement of post roads and rural delivery routes.

February 26, 1912 (2d Session): Mr. Ferris—H. R. 20837. To provide for a permanent, lasting and uniform system of improvement of public highways and post roads, and providing how the State and nation may act in conjunction and by mutual contribution bring about the desired end and distribute the surplus in the treasury pro rata each year among the States for that purpose.

February 28, 1912 (2d Session): Mr. Warburton—H. R. 20994. To provide that 25 per cent of the forest timber shall go to the States and Territories in which the forest is located for the benefit of public schools and public roads, and 25 per cent shall be used for the construction of roads and trails in the said forests.

March 5, 1912 (2d Session): Mr. Underwood—H. J. Res. 262. Creating a committee of congress to investigate the building of post roads in the United States.

March 26, 1912 (2d Session): Mr. Hensley—H. R. 22347. To provide for the building of good roads through the coöperation of the federal government, the States and Territories, and the counties thereof.

March 29, 1912 (2d Session): Mr. Cox of Ohio—H. R. 22579. To distribute the surplus in the Treasury of the United States to the several States, Territories, and the District of Columbia for the sole purpose of improving the roads therein.

March 29, 1912 (2d Session): Mr. Shackleford—H. R. 22581. Providing that the United States shall in certain cases make compensation for the use of highways for carrying free rural-delivery mail.

March 29, 1912 (2d Session): Mr. White—H. R. 22583. To distribute the surplus in the Treasury of the United States to the several States, Territories, and the District of Columbia for the sole purpose of improving the roads therein.

March 29, 1912 (2d Session): Mr. Neeley—H. R. 22585. To distribute the surplus, etc. (same as foregoing title).

March 29, 1912 (2d Session): Mr. Goeke—H. R. 22592. Providing that the United States shall in certain cases make compensation for the use of certain public roads of the States for the purpose of transporting free rural-delivery mails.

March 30, 1912 (2d Session): Mr. Byrns of Tennessee, Providing that the United States shall in certain cases make compensation for the use of highways for carrying free rural-delivery mail.

March 30, 1912 (2d Session): Mr. Rubey—H. R. 22652. To distribute the surplus in the treasury of the United States to the several States, Territories, and the District of Columbia for the sole purpose of improving the roads therein.

April 2, 1912 (2d Session): Mr. Burnett—H. R. 22768. Providing that the United States shall in certain cases make compensation for the use of highways for carrying free rural-delivery mail.

April 2, 1912 (2d Session): Mr. Raker—H. R. 22773. Providing that the United States shall in certain cases, etc. (same title as foregoing).

April 3, 1912 (2d Session): Mr. Powers— H. R. 22830. To establish in the department of agriculture a bureau to be known as the bureau of public roads, and to provide for aid by the federal government in the construction, maintenance, or improvement of the public roads in the several States and Territories.

April 5, 1912 (2d Session): Mr. Hanna—H. R. 22909. Providing that the United States shall in certain cases make compensation for the use of highways for carrying free rural-delivery mail.

April 6, 1912 (2d Session): Mr. Shackleford—H. R. 22952. Providing that the United States in certain cases shall make compensation for the use of highways for carrying rural mail.

April 8, 1912. (2d Session): Mr. Byrns of Tennessee—H. R. 22998. Providing that the United States in certain cases shall make compensation for the use of highways for carrying rural mail.

April 25, 1912 (2d Session): Mr. Langley—H. R. 23770. To establish in the department of agriculture a bureau to be known as the bureau of public highways, and to provide for national aid in the improvement of the public roads.

April 26, 1912 (2d Session): Mr. Sims—H. R. 23826. Declaring all highways in the several States used for the purpose of transporting rural mail to be post roads, and authorizing the improvement of same.

May 24, 1912 (2d Session): Mr. Warburton —H. R. 24825. Making an appropriation for the construction of a wagon road through the Olympic National Forest.

May 27, 1912 (2d Session): Mr. Davenport—H. R. 24891. To establish public highways or roads along all section lines of Indian reservations, etc.

July 25, 1912 (2d Session): Mr. Rucker of Colorado—H. R. 25974. To provide for an appropriation of $10,000 for the building of a public road through the Medicine Bow Forest Reserve, Colorado.

December 3, 1912 (3d Session): Mr. Mondell—H. R. 26540. Dedicating 25 per cent of the proceeds of public lands to the construction and improvement of public roads.

December 10, 1912 (3d Session): Mr. Mondell—H. R. 27012. Providing for the expenditure of 25 per cent of the receipts from national forests for road and trail construction.

On January 7, 1913, Senator Swanson, of Virginia, a member of the joint committee, introduced a bill providing for an appropriation of $25,000,000 to be apportioned among the various States, one-half on the basis of population and one-half on the basis of rural delivery routes and star routes, the conditions being that each of the States should provide an equal amount, and providing further that no State should receive less than $100,000. The State or local authorities are authorized in the bill to make application to the director of the office of public roads in the United States department of agriculture for such national aid and to designate in their application the roads which they desire to have improved, the requirements being that such roads must be post roads, that they must be main traveled highways, and that their improvement must be for the good of the State. When the said director has satisfied himself that these conditions are complied with, the preliminary arrangements, the awarding of contracts, and the construction and maintenance of the roads rests jointly with the national and State or local authorities so long as the government contributes money aid. The bill provides that the aid shall be given for construction, improvement, or maintenance, this to be determined by the State or local authority, subject to the approval of the director of the office of public roads.

ROAD LEGISLATION IN THE UNITED STATES

National

Office of Public Roads, U. S. Department of Agriculture

General Expenses, Office of Public Roads.—For salaries, and the employment of labor in the city of Washington and elsewhere, supplies, office fixtures, apparatus, traveling and all other necessary expenses for conducting investigations and experiments, and for collating, reporting, and illustrating the results of same, and for preparing, publishing, and distributing bulletins and reports as follows: *Provided*, That no part of these appropriations shall be expended for the rent or purchase of road-making machinery except such as may be necessary for field experimental work as hereinafter provided for:

For inquiries in regard to systems of road management throughout the United States and for giving expert advice on this subject, $25,000;

For investigations of the best methods of road making and the best kinds of road-making materials, and for furnishing expert advice on road building and maintenance, $75,000;

For investigations of the chemical and physical character of road materials, $25,000;

For conducting field experiments and various methods of road construction and maintenance, and investigations concerning various road materials and preparations; for investigating and developing equipment intended for the preparation and application of bituminous and other binders; for the purchase of materials and equipment; for the employment of assistants and labor; for the erection of buildings; such experimental work to be confined as nearly as possible to one point during the fiscal year, $30,000;

For general administrative expenses connected with the abovementioned lines of investigations and experiments, $10,100;

In all, for general expenses,$165,100.

Total for Office of Public Roads, $202,120.

And not to exceed 10 per cent of the foregoing amounts for the miscellaneous expenses of the work of any bureau, division, or office herein provided for shall be available interchangeably for expenditures on the objects included within the general expenses of such bureau, division, or office, but no more than 10 per cent shall be added to any one item of appropriation except in cases of extraordinary emergency, and then only upon the written order of the Secretary of Agriculture.

ALABAMA

Constitution.—The State shall not engage in internal improvements nor lend money or its credit in aid of them.

The legislature shall not authorize county, city or other political subdivision of a county to issue bonds until they have been authorized by the qualified electors, at an election for such purpose.

The legislature shall not, in any one year, levy a tax greater than 65-100 of 1 per cent.

No county, city or other municipal corporation shall levy a greater taxation in any year than one-half of 1 per cent; except that an additional levy may be made to pay debts existing on December 6, 1875, and also any liability now existing against any county or that may be hereafter created, for the erection of necessary public buildings, bridges or roads.

No county shall become indebted for a total of over 3½ per cent, nor shall any city or other municipal corporation, having less than 6000 population become so indebted in excess of 5 per cent, or town having a population of 6000 or more may not exceed 7 per cent indebtedness.

The legislature may appropriate a portion of net revenue from the convict fund, for the improvement of public highways.

Local Administration.—The court of county commissioners consists of a probate judge and four other commissioners; by special statute board of revenue or other like boards may be created to take place of boards of commissioners. The court of county commissioners has charge of all public highways, bridges, causeways and ferries and may levy a special tax to build or repair them. The court may divide the county into road precincts and appoint one or more apportioners for each election precinct, who shall appoint a road overseer to each road precinct. The apportioners cannot serve more than four years, and shall be entitled to a certificate of exemption from road service for two years after the expiration of their term of service.

The court may appoint a supervisor of public roads, who shall be a competent civil engineer and shall receive not to exceed $5 for each day employed. The supervisor shall make surveys, grades, maps, plans, etc., of all road and bridge work that may be directed by the court; shall direct the overseers, contractors, employes, etc., in construction and maintaining the public roads, bridges, culverts, drains, etc.

Statute Labor.—Within fifteen days after their appointment, the apportioners must make a list of all persons liable to road duty and within twenty days, must apportion the hands among the overseers. Within five days thereafter, they must furnish a list to each overseer of the hands assigned to him. They must also inspect the roads in their precinct and see that they are regularly posted and properly cared for. All apportionments of hands shall be subject to revision by the court.

The overseers must call out the hands assigned them, and work with them on the roads ten days each year, if necessary to keep the roads in good repair. They shall measure the roads within their respective precincts within three months after their appointment and set up mile posts with the number of miles to the court house or other noted place to which the road may lead; at the cross-roads index boards shall be erected, and they shall build bridges and causeways, when necessary, unless the court shall have same built by contract.

Road Taxes.—The courts may divide their respective counties into road districts for ordering an election therein upon the question of levying a special road tax not to exceed one-fourth of 1 per cent, or the court may hold a county election levying a similar tax for the entire county. A majority is necessary to authorize the levy.

The court may transfer to the county road fund any surplus general fund in the county treasury.

Poll Tax.—All males between eighteen and forty-five are subject to road duties, except those who are incapable of hard labor and present a certificate from a physician to that effect.

Ten days work from those liable to road duty may be required, but not upon any road or bridge which is six miles distance from their homes. This labor tax may be commuted by the payment of $10 per year.

Contractors.—The court may, after due advertisement, let to contract the construction or maintenance of any bridges, roads, culverts, ferries, drains etc.

Toll Roads.—The court may authorize gates across the public roads, and may fix tolls on all bridges and ferries in their respective counties.

Convict Labor.—The convicts of any county or municipality may be worked upon the public roads, bridges or ferries of the county under the direction of the court, or they may be hired to contractors. Convicts shall not be worked in squads or companies with other persons liable to road duty upon the public roads, bridges, etc.

State Aid.—The state highway commission consists of a professor of civil engineering in the Alabama Polytechnic Institute, the State geologist and three civilians appointed by the governor who hold office for four years.

The governor may remove any member for inefficiency, malfeasance or neglect of duty. A State highway engineer shall be elected by the commission who shall be a competent engineer and experienced and skilled in highway construction and maintenance. He shall hold his office subject to the pleasure of said commission, and his salary shall not exceed $4000 per annum.

The said State highway commission and the said State highway engineer shall constitute said State highway department.

The said State highway engineer shall be required to give a bond of $5000 before entering upon his duties. He shall keep a record of every vote and official act of said commission, he shall file all the maps and papers belonging to the commission, and he, or his assistants, shall give such advice and assistance to counties throughout the State as time and conditions will permit.

The engineer and his assistants shall be allowed their necessary traveling expenses. The attorney-general of the State shall be ex-officio attorney for the commission.

Said highway engineer shall cause to be made and kept by the State highway department a general highway plan of the State; shall collect information and prepare statistics relative to the mileage, the character and condition of the highways and bridges in the different counties in the State, and shall, within two years from the passage and approval of this act, prepare a map of such of the main highways in the State, as, in his judgment, are of sufficient importance to be designated as State roads that may be improved and maintained at the cost of the State, in coöperation with the counties and report the same to the highway commission for submission to the legislature for adoption as a proposed system of trunk or State roads.

He shall determine the character and have the general supervision of the construction and repair of all roads and bridges improved under the provisions of this act.

It shall be the duty of the State highway commission to consider at their meetings all questions relating to the general policy of the said State highway department, and the conduct of the work in general, and to act for the State highway department in all matters pertaining to recommendations, estimates and appropriations, and such other matters as it may be found reasonable to submit to the governor or the State legislature. On or before April 1 of each year, the commission shall submit a printed report to the governor, covering all operations of the department during the year. When practicable, the commission shall investigate the location of road materials in the State and in the study of same, shall have the coöperation of the State geologist and the professor of civil engineering of the Alabama Polytechnic Institute. All expenses of said State geologist or professor of civil engineering, while thus officially engaged, shall be paid, in addition to their regular compensation allowed by law.

An annual appropriation of $154,000 is made for State aid and the support of the State highway department, provided the expense of the highway department, does not exceed $10,000, unless in the opinion of the governor, the public demands on the highway department, shall require an additional sum, in which event, he may at his descretion increase the amount not to exceed $20,000. This appropriation is made from the convict fund, provided that after the first year beginning in 1912 all special funds for the improvement of the public roads, culverts and bridges in Alabama, which may accrue from any other source and be in the State treasury shall be in lieu of said convict fund hereinabove provided for to the extent of the amount thereof, thereby relieving said convict fund to such extent.

The appropriation, less the actual expenses of the commission, shall inure to the equal benefit of every county in the State. The commission shall apportion the same among the different counties on or before February 1 of each year, and shall notify the probate judge of each county to such effect. No money, however, shall be drawn from the State road fund by any county, until the said county shall have appropriated and rendered available a sum of money equal in amount. Whenever any county shall decide to use the funds appropriated to it, the county commissioners or boards of revenue or other proper authorities, shall make written application to the State highway commission and the said State highway engineer shall investigate and either approve or disapprove such application.

Rules and regulations for the construction, improvement and maintenance of public roads, culverts, and bridges shall be formulated by the highway commission and shall be printed and forwarded to the probate judge and the county commissioners.

No member or employee of the highway department shall be, either directly or indirectly, interested in any contract for construction, improvement or maintenance of any road, culvert or bridge under this act, or in the sale of any machinery, material or anything whatever entering into such work.

The State highway engineer shall furnish a competent engineer, where needed, during the progress of construction in any county, who shall supervise said work and see that plans and specifications are provided and complied with. Whenever the cost of any one piece of work, for which State aid is required, shall exceed $3000, the highway engineer with the consent and advice of proper authorities in the county, may prepare plans and specifications for advertising for bids. The county commissioners or boards of revenue or other proper authorities in such county shall receive bids for all or a part of said work and let the contract to the lowest bidder, subject to the approval of the state highway commission, reserving the right, however, to reject any and all bids and call for new bids, or perform the work or part of said work by day labor or convict labor, as may be deemed to the best interests of the State and county, subject to the approval of the State highway engineer. Where any work is done by contract, the State highway commission shall require a bond from the contractor in an amount double the contract price. The highway engineer may authorize partial payments to any contractor performing any highway or bridge improvement, under the provisions of this act, as the same progresses.

When ever any road shall be improved, under the provisions of this act, it shall be the duty of the commission to prescribe rules and regulations under which the State highway engineer shall hereafter require all such roads to be kept in proper repair, and should any county fail or refuse to carry out any reasonable recommendation of the State highway engineer in the maintenance of such road, the commission may prescribe rules by which the same may be done by the State and the expense therefor shall be paid by the county or may be paid, in the event the county defaults, out of any money due or to become due to said county, under the provisions of this act.

If in the opinion of the governor the condition of the treasury shall warrant the same, he is hereby authorized to increase the amount herein appropriated for any year to a sum not to exceed $4000 per annum to each of the several counties in the State, provided that the counties shall each appropriate a like amount, as provided for in this act.

All roads and highways built under this act are and shall be in perpetuity, free of toll.

ARIZONA

State.—The State engineer is appointed by the governor with the consent of the council and holds office for two years. He is required to be a practical competent civil engineer and is allowed a salary of $3000 per annum with actual traveling expenses not to exceed $2500 per annum. He is required to give bond approved by the governor in the sum of $5000.

Board of Control.—The governor and auditor of the State and one citizen appointed by the governor who shall hold his office for two years, and shall be ex-officio secretary, shall constitute a board of control with full charge of all charitable, penal and reformatory institutions that now exist in the State or that may be hereafter be created, including the capitol building and grounds. Not more than two members of said board shall belong to the same political party.

The governor shall be allowed no compensation for any services rendered as a member of the board of control. The citizen member shall receive a salary of $1800 per annum and actual traveling expenses incurred in the discharge of his duties, to be paid monthly out of the treasury, and he shall devote his sole time to the discharge of the duties devolved upon him by this chapter; Provided, that before entering upon his office he shall give a bond of $10,000.

The auditor shall hereafter receive a salary of $1800 per annum and actual traveling expenses while in the discharge of his duties, which shall be in full for his services as auditor and member of the board of control.

Duties of Board of Control.—They shall require the State engineer to select, map, plat, and furnish estimates of cost of State highways and shall designate such roads as they may deem proper to construct and maintain as State highways. They shall fix the amount of State road tax to be levied by the State auditor in the several counties within the limits of assessment as explained under "State Road Revenues." The board of control may adopt plans and specifications for State highways and shall then advertise for bids, contracts to be awarded to the lowest responsible bidder but the board shall have the right to reject any and all bids.

State Road Revenues.—A levy not to exceed 25 cents on each $100 of assessed valuation is made in counties where State highways are constructed and maintained, and a levy not to exceed 25 cents on each $100 of assessed valuation in counties in which no road work is being done or to be done on State highways, and the proceeds are placed in a fund known as the "State road fund." All State highways and bridges under the provisions of this act are constructed and maintained at the cost of the State.

Duties of State Engineer.—All highways and bridges constructed or improved under the terms of this act are known as State highways and bridges and they shall be improved and maintained according to plans and specifications made by the State engineer. He shall aid the board of control in such manner as they may require in the selection and designation of State highways, and in constructing and maintaining the same at the expense of the State of Arizona. He shall also aid the county superintendents of roads by giving advice. All work done upon the State highways and bridges shall be under the supervision of the State engineer. The State auditor shall draw warrants for the payment of amounts due contractors upon certificate from the State engineer.

Local Road Legislation.—The board of supervisiors of each county shall appoint a county superintendent of roads, who shall have charge of all public roads and highways in the county, subject to the orders of the board of supervisors.

Taxes are not assessed in labor.

Taxes levied on property for road purposes cannot be worked out.

The board of supervisors may levy a tax of not to exceed 25 cents on each $100 of real and personal property in the county for road purposes.

There is no authority for the issuance of road bonds.

A road poll tax of $2, payable in cash, shall be assessed against every able-bodied male resident, between twenty-one and sixty years of age.

ARKANSAS

Constitutional.—Neither the State nor any county, city, or other municipality shall ever loan its credit for any purpose whatever, nor issue any interest-bearing evidences of indebtedness, except such bonds as may be authorized by law to provide for the payment of the present existing indebtedness.

The general assembly shall not have power to levy State taxes, for any one year, to exceed, in the aggregate, 1 per cent. No county shall levy a tax to exceed one-half of 1 per cent, for all purposes.

The county court, with a majority of the justices of the peace of such county, in addition to the amount of county tax allowed to be levied, shall have the power to levy, not exceeding 3 mills on the dollar, which shall be known as the county road tax, for making and repairing public roads and bridges in the county. Such levy shall only be made when a majority of the qualified voters of such county shall have voted favorably thereto, at the general election for state and county officers, next preceding.

Statutory.—The public roads, running most centrally through the county and most used by the public, shall be designated as first class roads. All other public roads are second class roads. First class roads are to be worked first and second class roads are to be worked as the county court shall order.

Administration.—The control of the public highways vests with the county court. The court shall lay off and divide the county into road districts and appoint one overseer for each district each year, at a salary of $1.50 per day for time actually employed.

If the electors of a county vote a public road tax, the county court may employ one resident householder of the county as road commissioner, to receive a salary of $2 per day when actually employed.

A law was passed May 25, 1897, making it optional with the county court to declare each township a road district, with the qualified voters thereof to elect a road overseer as other township officers are elected.

Taxation.—If a majority of the electors of the county have voted a public road tax at the next preceding general election, the county court together with a majority of the justices of peace of the county, shall levy not less than 2½ nor more than 3 mills on the dollar, as a road and bridge tax.

Each male person, between the ages of twenty-one and forty-five, except such as are exempt by law, must work four days on the roads and bridges in his district, or pay to the overseer $1 per day in lieu, thereof. Road taxes may be worked out at the rate of 75 cents per day, after the time required by statute is worked out.

Convict Labor.—County convicts may be worked upon the public highways.

Road Improvement Districts.—Upon petition of a majority of the property owners in a county or part of a county, the county court shall, after public notice, investigation, and hearing, make an order declaring the area covered by said petition to be a road improvement district and shall appoint three persons therein who shall compose a board of directors each of whom shall receive $3 per day for time actually engaged. The board shall have full authority in the construction, maintenance and repair of roads within their district, shall make contracts, expend money, etc., but shall not create liabilities, which exclusive of interest, shall exceed 30 per cent of the total assessed value of property in said district. As soon as the board forms a plan of improvement and ascertains the cost thereof, it reports to the county judge who appoints three electors of the county as a board to assess the benefits and burdens on the property within the district. No local assessment shall in any one year exceed 25 per cent of the assessed benefits accruing to said property.

CALIFORNIA

State Highway Officials.—A department of engineering consisting of an advisory board, composed of the governor, who is ex-officio chairman; a State engineer, who is the chief executive officer of the department; the general superintendent of State hospitals; the chairman of the State board of harbor commissioners of San Francisco; and three appointed members, has authority over State highways and all participation by the State in works of highway improvement. The State engineer is appointed by the governor and his salary is $5000 per annum. The governor also appoints a highway engineer, salary $10,000 per annum and the State engineer, the appointed members and the highway engineer all hold office at the will and pleasure of the governor.

Other State Officials.—The State board of prison directors has full control of the rock crushing plant at the State prison at Folsom and may sell or dispose of the crushed rock for highway purposes at cost of production plus 10 per cent, provided no rock shall be sold for less than 30 cents per ton, preference to be given to orders from State highway authorities.

Duties of State Highway Officials.—The department of engineering has full charge of all State highways; all public works formerly under the direction of the department of highways; all expenditures of the State for highway purposes and all money appropriated for such purposes shall be made payable upon the order of the department. The department is authorized to examine highway conditions in the State and make such other investigations as it deems desirable. The department is given full authority to select the routes of the State highway system hereinafter described and to determine the character of materials to be used, make all purchases and do all things necessary in the construction and maintenance of said State highway which shall be permanently maintained and controlled by the State of California.

By a resolution of the department of engineering the appointed members were constituted a committee known and designated as the "California Highway Commission" with the following jurisdiction and powers:

RESOLVED: that the appointed members of this board, to wit:—Messrs Charles D. Blaney, Burton A. Towne, and N. D. Darlington, be and they are hereby appointed a committee to be known and designated as the 'California Highway Commission," with the jurisdiction and powers following; to wit:

(1) To take full charge of the entire matter of the construction and acquisition of a system of State highways in and for the State, as and in the manner provided by law, at a cost not to exceed the sum of $18,000,000 under and in pursuance of the act of the legislature of the State of California approved, March 22, 1909, and known as the State highway act, and to do and perform as fully and completely as may be done by any part, or representative, or committee of this advisory board, every act and thing that shall be requisite to be done and performed in connection with the highways of the State of California, or that ought to be done and performed under the said State highway act.

(2) To do and perform every act and thing in and about the premises that a committee of this board may be lawfully authorized to do for or on behalf of this board; and to have full charge and control of the acquisition and construction of the laying out and the building of a system of such highways.

(3) To report from time to time to this board their actions and proceedings and to submit to this board for determination such matters as the law requires this board to act upon; and to superintend the work and operations of the highway engineer whose appointment is provided for by the act of the legislature of the State of California, approved April 8, 1911.

(4) To perfect such organization as they may deem necessary to carry on with celerity and efficiency the work to be done in the matter of the

acquisition and construction of the said system of State highways, and under said State highway act; and generally to do all and singular every act and thing that may be necessary for the due, speedy and efficient performance of all that may be required under the said State highway act, and under the said act of the legislature of the State of California, approved.

April 8, 1911.

The highway engineer reports to the California highway commission.

State Bond Issue.—The legislature of 1909 passes an act which was ratified at the general election in 1909 authorizing the issuance of $18,000,000 in bonds for the acquirement and construction of a continuous and connected system of State highways, running north and south traversing the Sacramento and San Joaquin Valleys and along the Pacific coast and connecting the county seats lying east and west of such highway. These highways are to be permanent in character. Each county must pay into the State treasury, annually, a sum equal to the interest at 4 per cent, upon the entire sum of money expended within such county in the construction of said State highway, less such portion of the amount so expended as the bonds matured shall bear to the total number of bonds sold and outstanding.

Revenues other than Bond Issues.—Special appropriations are made to construct and maintain the State roads exclusive of the State highway system above described. California has eleven State roads cared for in this manner, all of which are in the mountainous country and in localities too poor financially to pay for their building and upkeep.

County Roads.—Boards of supervisors of the various counties of the State have charge of county roads, and in some case appoint foremen directly under their charge to handle the work.

Convict Labor.—The rock crushing plant at the State prison at Folsom is operated by convict labor.

Present Status of State Highway Work.—Much of the work will follow existing roads, after the rights-of-way have been straightened, but in the mountainous parts of the State, many of the roads will have to be re-located and in some instances, roads will be construcstructed where none have existed previously. The State has been divided into seven divisions, each under the immediate charge of a division engineer. The roads will be constructed to suit the traffic needs and the types to be built will vary from well graded dirt roads to the highest type of asphalt macadam.

COLORADO

Constitution.—Special or local legislation, for laying out, opening, altering or working or vacating roads, regulating county or township affairs, or chartering toll bridges is forbidden. Indebtedness contracted in any one year shall not exceed the following rates: Counties having assessed valuation exceeding $5,000,000, $1.50 on each $1000 thereof; valuation of less than $5,000,000, $3 on each $1000 thereof. The aggregate indebtedness of any county for all purposes exclusive of debts contracted before the adoption of the constitution, shall not at any time exceed twice the amount herein limited unless authorized at a general election by the qualified electors of the county. Bonds shall not run less than ten years.

State Highway Officials.—The State highway commission consists of three members appointed by the governor and holding office two, four, and six years respectively, one vacancy occurring every two years. The commission selects its chairman who receives a salary of $1200 per annum while the two other members receive $600 each per annum. The members of the commission are not required to give their entire time to the work. They are required to meet not less than once a month. They appoint a secretary who shall be a civil engineer and practical road builder and he shall receive a salary not to exceed $2500 per annum and hold office at the pleasure of the commission. The commissioners and all employees are paid expenses when on official duty. The attorney general of the State is ex-officio attorney to the commission.

Duties of State Highway Officials.—Commission was required to complete by January 1, 1912, map showing public roads in each county and all roads of sufficient importance to receive State aid, and form a connected system of State roads. The commission may designate the most important roads as the first to be improved. Commission must ascertain location and availability of road material throughout the State, methods of construction best adapted to each section, and prepare rules and regulations for construction and maintenance of State roads. Duplicate of maps prepared by county commissioners, showing all public roads must be filed with the commission, and upon failure of county commissioners to do this, the commission must prepare them and deduct their cost from first appropriation to such county. The commission shall apportion State aid fund among counties on or before first Tuesday in March of each year considering area, amount of money expended in road construction, difficulty and expense of such construction, and extraordinary expenses connected with development of new territory, but no part of appropriation shall be expended within corporate limits of cities or towns, nor in any county in which commissioner shall not within ninety days after apportionment have provided for raising by taxation an amount equal to twice the amount apportioned. Amounts apportioned and not called for are distributed to other counties.

State highway commission passes upon plans, specifications estimates, etc., made by county commissioners for State roads and has authority to approve, alter or disapprove. Commission must also pass upon and approve contracts for State road before award by county commissioner. All construction and maintenance of State roads by county commissioners subject to supervision and approval by State highway commission. A detailed report with recommendation shall on first of December preceding each session of legislature be made to the governor by the commission.

Duties of County Officials in Relation to State Aid.—County commissioners prepare a map showing all public roads in the county and designate on the map those of sufficient importance to justify their improvement as State aid roads, and file duplicate with State highway commission with statement showing location, character and extent of all road materials in the county. They shall make necessary surveys, establish grades, prepare plans, specifications and estimates for all work on State roads and shall report same to State highway commission for approval. Work shall be done according to plans, specifications and estimates as finally adopted by the commission. All contracts shall be let by county commissioner, after approval by State highway commission. Fourteen days notice shall be given if estimate exceeds $1000 and contract must be let to lowest bidders, but all bids may be rejected. Contractor must give bond to State equal to half of contract price. Partial payments may be made but at least 10 per cent shall be withheld until completion and acceptance.

All construction and maintenance shall be under county commissioners subject to supervision and approval of State highway commission. County commissioners may employ for this work a competent civil engineer and road builder who shall receive not more than $7 per day.

County commissioners shall make before November 30 of each year two detailed reports to State highway commission showing all moneys expended by county on roads during current year, one for State roads and one for all other roads, and these shall contain recommendations as to roads which shall be improved the following year.

State Aid Fund and Apportionment.—All moneys accruing from forest reservations in State under act of Congress approved May 23, 1908, shall be apportioned by the State treasurer among counties in which such reservations are situated in proportion to area of forest reservations in county, apportionment to be made at the beginning of fiscal year and each six months thereafter. Board of county commissioners shall direct that not less than 5 per cent of such fund shall be expended for either roads or schools in discretion of board.

State appropriates specific sums for entire cost of roads and bridges from time to time, these appropriations being special, but aggregating a considerable amount. Such work has been done under State engineers.

Convict Labor.—At the request of the county commissioners the warden of the State penitentiary shall detail such a number of convicts as he shall deem proper to work upon public roads and highways of each county provided that the county shall pay all additional expenses of guarding the convicts while working upon the public roads within the county and shall furnish all tools and materials for their work.

The board of commissioners of the State penitentiary and the warden are required to employ such a number of prisoners as they may deem practicable upon the construction of certain specified State roads, including the Santa Fe Trail. The convicts are granted additional "good time" allowances in the case of short term men and better food for prisoners serving life sentence conditioned upon their good behavior and efficient work. The said board has supervision over the convicts and may appoint competent superintendents.

Toll Roads.—Toll road companies may be incorporated and the county commissioners are authorized to prescribe the rates of toll to be charged.

Indebtedness for Road Improvement.—The county commissioners may when they deem it necessary, enter an order specifying the amount of indebtedness of any county, in which the assessed valuation of property shall exceed $1,000,000, for all purposes not to exceed the following rate: Where the valuation exceeds $5,000,000, $6 on each $1000; where the valuation shall be less than $5,000,000 and shall exceed $1,000,000, $12 on each $1000 thereof. Bonds shall run not less than ten nor more than twenty years and shall bear interest not exceeding 10 per cent per annum, payable semiannually on April 1 and October 1. The commissioners shall levy annually a tax sufficient to discharge the interest on the bonds, and shall levy annually after ten years, from the date of issuance, such fund as shall equal 10 per cent of the amount of the bonds issued in order to provide a sinking fund for the redemption of bonds. The bonds shall not be sold at a discount of more than 15 per cent of their par value and shall only be sold for cash.

Road Districts.—The county commissioners may divide the county into road districts and appoint a general road overseer for the county, to hold office for two years, who shall have supervision over all road work and authority to appoint deputy road overseers as authorized by the county commissioners. Such deputy road overseers shall within their respective districts exercise the powers of the general road overseer but be subject to his orders. The general road overseer shall receive compensation not to exceed $5 per day employed, which shall include traveling and personal expenses, the total amount paid not to exceed $1200 a year, to be paid out of the county treasury. Each deputy road overseer shall receive not to exceed $3 for each day's service, to be paid out of the general road fund.

The county commissioners may determine the amount to be expended in each district but it shall not be less than 50 per cent of the road tax collected therein.

Tax Levy for Road Purposes.—The county commissioners may levy property tax not to exceed $1 on each $100 valuation.

Road Poll Tax.—Every able bodied man between the ages of twenty-one and forty-five years shall pay to the road overseer a tax of $2 or perform two day's work or one day's work with team on the public roads under the direction of the overseer. The road overseer receives a commission of 10 per cent on such taxes collected by him and turned over to the county treasurer.

Corporate Road Districts.—A majority of the electors of any county may petition the county commissioners for the organization of the county into corporate road districts. If after a year the commissioners determine to comply with the petition they shall divide the county into districts and name a board of directors for each district and shall appoint for the county a superintendent of roads and bridges and abolish the services of the road overseer. The superintendent shall receive such compensation as the commissioners may determine, not to exceed $5 per diem. The board of directors of each district shall consist of three members, who shall have complete authority over the roads and bridges of their district. The commissioners in any county organized under this act shall levy a special property tax for road purposes not to exceed 50 cents on each $100 as requested by the directors of the respective districts. Able bodied men between twenty-one and fifty years shall under this act pay to the board of directors a road tax of $3 or labor two days on the public roads. The directors shall be elected bi-ennially, and shall receive no fees or compensation except $1 for each meeting actually attended. They shall meet once a month and special meetings may be called at any time by the president.

CONNECTICUT

State Highway Officials.—A State highway commissioner, who shall be a capable and experienced road builder, shall be appointed by the governor, with the advice and consent of the senate, and shall hold office for four years and shall receive an annual salary of $5000 and actual traveling expenses not to exceed $1000 in any one year and office expenses not to exceed $17,500 in any one year,

Duties of State Highway Commissioner.—He shall keep a record of all proceedings and orders pertaining to the matters under his direction and copies of all plans and specifications and estimates, submitted to him, and shall prepare and submit to the general assembly a biennial report of his doings. He shall have a right to enter any town in the State and lay out and improve any of the trunk lines, and shall certify the cost of such improvement to the State comptroller for payment. He shall keep all State roads in proper repair and shall certify the cost of same to the comptroller. The highway commissioner shall appoint a deputy commissioner, eight division engineers, and such other engineers, deputies, and inspectors as he may deem necessary and shall fix their salaries not to exceed in the aggregate $75,000 in any one year. He shall divide the State into eight highway districts each under the supervision of a division engineer. The highway commissioner may use the stone crushers owned by the State in any town in which a highway is to be improved under the provisions of the State aid law, provided the aggregate expenses of operating the crushers shall not exceed $5000 in any one year. The highway commissioner has authority to approve the application of the selectmen of any town for State aid and he shall select the highway to be improved, and make all surveys, plans and specifications therefor, determine the character and have supervision of such work of construction. He may at his discretion permit the towns to make improvements without competition where the cost is $1000 or less. Where the cost exceeds $1000 he shall advertise for bids. He shall notify the selectmen of the time of opening the bids and he shall have the right to reject any and all bids, otherwise he shall award the contract to the lowest responsible bidder who shall furnish bond for one-third of the cost of construction. Copy of the contract shall be filed with the highway commissioner.

Duties of Local Officials.—Whenever any town shall declare its intention to improve a public road under the State aid act the selectmen thereof shall apply to the highway commissioner, which application is subject to his approval. Improvements costing $1000 or less as above stated may be made by towns without competition at the discretion of the highway commissioner. The selectmen may be present at the opening of bids by the highway commissioner. The selectmen shall also be parties to the contract after award by the highway commissioner and they may also tender in common with other bidders and shall be subject to the same requirements. Any town having within its limits any road forming part of the trunk line systems as shown by the map of trunk line roads accompanying the report of the highway commissioner for 1907 and 1908 may by improving it to comply with the specifications laid down by the highway commissioner offer it to the state as a part of the trunk line systen to be maintained.

State Aid Funds and Their Distribution.—In towns having taxable valuation of over $1,250,000 the State pays three-fourths of the cost of roads constructed under the State aid act, and in towns having a valuation of $1,250,000 or less, the State pays seven-eighths of the cost of such construction, the basis of award being the grand list made by the town in which the highway is to be constructed, as revised by the board of equalization, the whole amount to be paid by the State in any one year being $500,000. Any town with the consent of the State highway commissioner may use the full amount of the appropriation to such town for the current and next ensuing year and the appropriation shall be paid by the State as though the work had been done in two years, under separate appropriations. The sum so expended shall not exceed $10,000 per town in any one year. The trunk line system in the report of the highway commissioner of 1907 and 1908 is to be constructed and maintained at the cost of the State, provided that the total amount so expended for construction shall not exceed $2,000,000 before September 30, 1913.

Care and Maintenance.—The maintenance of all roads constructed under the State aid act shall be paid for by the State. The expense of such repairs on the trunk line systems shall be paid wholly by the State, but the expense of repairs on State roads other than those on the trunk line systems shall be borne by the State and town in the ratio of three-fourths and one-fourth respectively. The appropriation for care and maintenance is $100,000 a year, plus all moneys received by the State from the licensing of automobiles, fines, etc., which will amount to about $300,000 for the two years.

State Bond Issue.—An act approved September 19, 1911, provides for the issuing of bonds to the amount of $3,000,000 for the improvement of public roads, same to be expended during the two years ending September 30, 1913.

Powers of Highway Commissioner Relating to Trunk Lines.—The highway commissioner shall have the power to lay out, alter, widen, and grade any highway within the State whenever, in his judgment, the interests of the State require such action in connecting with the trunk line highways. He shall give reasonable notice to those who will be affected by the new layout and shall cause a survey to be made showing such highway, with a description of each parcel of land taken from or annexed to the lands of adjoining proprietors. A hearing shall be given to parties interested and benefits and damages shall be awarded in conformity with the general statutes. The highway commissioner also shall have the same powers as the selectmen of the various towns so far as trunk line highways are concerned. No person or corporation except a municipal corporation, through its proper officer has the right to excavate in any highway which is a part of the trunk line system unless a permit be first obtained from the highway commissioner.

Local Road Legislation.—Jurisdiction over the roads vests in the selectmen of the towns, but the county commissioners may intervene, when petitioned in writing so to do, if the town or selectmen refuse or neglect to repair the roads therein, and the county commissioners may order repairs to be made.

Taxes are not assessed in labor.

Property taxes shall not be worked out.

The towns may levy sufficient highway taxes to build and repair highways and bridges.

There is no poll tax assessed for road purposes.

DELAWARE

State Highway Officials and Their Duties.—The governor shall appoint, with the consent of the senate, a resident of Newcastle County as the Newcastle County State highway commissioner, who shall serve for four years, and receive a salary of $1000 per annum. He shall give a bond of $2000. He may employ, subject to approval by the levy court necessary assistance. He shall investigate methods of construction and maintenance and prepare maps and plans showing roads upon which he recommends improvements. Separate specifications shall be made for macadam, telford, gravel, oyster shell or any other material which at all tines shall be smooth and convenient for travel. The permanent highways improved under this act, shall not be less than nine or more than sixteen feet between shoulders, and the minimum width of right of ways shall be 33 feet, except in roads already existing.

The State highway commissioner shall keep a record of all proceedings, orders, petitions, specifications, accounts of money expended by State, county or property owners, and shall prepare a biennial report, with recommendations, to be submitted to the general assembly, during the first ten days of the biennial session.

The State highway commissioner shall have surveys, plans and estimates prepared for the improvement of any highway selected by the levy court, and submit the same to said court. In no case shall State aid be granted unless approved by the State commissioner.

The State highway commissioner shall advertise for bids for the construction or improvement of State aid roads. Either the commissioner or the levy court may reject any or all bids for cause, otherwise the levy court shall award the contract to the lowest responsible bidder, who shall give bond in the sum of one-third the contract price. The commissioner shall certify the amounts to be paid the contractor, as the work advances, but not to exceed 80 per cent of the full value of the work done prior to such time shall be paid. Five per cent of the contract price shall be withheld for one year after the acceptance of the work and all contracts entered into, under the provisions of this act, shall provide for the maintenance of such highway, for a period of one year, at the expense of the contractor.

The said highway commissioner shall have entire charge of all work done under such contract and his decision shall be final. He shall appoint a supervisor of construction of the work under contract, who shall receive three dollars per diem, to be paid by the levy court. Said commissioner may at any time discharge such supervisor for incompetency or neglect of duty.

County Officials and Their Duties. The levy court of Newcastle County has authority to approve recommendations made by the Newcastle County State highway commissioner. The levy court has authority, in the first instance, to select roads to be improved by State aid, but such selection is subject to approval by the said State highway commissioner. The levy court has power to appropriate such monies as may be necessary, from time to time, for carrying on the work. The duty of keeping roads, constructed under the provisions of this act, in repair, shall devolve on the levy court, and it may be the duty of said court to appoint a county supervisor to hold office for a term of four years, and to determine his salary or allowance.

It shall be the duty of the county supervisor to report to the levy court all repairs deemed necessary on such roads, and under the direction of said court, to spend the money raised for such repairs.

By the act of 1907, the levy court of Newcastle County is required to appoint a competent and skilled road engineer, to be paid a salary of $2500 per year, to hold office for the term of four years, unless sooner removed for cause, and the act also provided that it would be no objection to said county road engineer if he should also hold the office of Newcastle County State highway commissioner, provided, that if one person should fill both offices, the salary paid to him by the said levy court, should only be $1500 per annum.

Abutting Property Owners.—The property owners along any highway in the county, not improved under the provision of this act, may assume the whole expense of the improvement of such highway, and prepare a plan, including the levels and distances, and all specifications, and submit a copy of such plans, specifications, etc., to the State highway commissioner, to be by him submitted to the levy court of Newcastle County, as in the case of other plans and specifications. If the commissioner and levy court approve, the owner or owners may accept bids and take contracts for the construction of such road, and shall have control of the expenditure of the money so used, subject to the approval and supervision of the county supervisor. Upon the completion of such road to the satisfaction of the supervisor, commissioner and levy court, and the full payment therefor, such highway shall thereafter be a county highway the same as other highways improved under the provisions of this act.

Road Revenues and Their Distribution.—One half of the cost of highways constructed under the provisions of this act, shall be paid by the State, provided, that the amount expended shall not in any year exceed the sum appropriated by the general assembly. The levy court shall provide all necessary funds to keep such roads in repair, except in the limits of incorporated cities, and if there be no money on hand for such purposes, they may borrow therefor, on temporary loans, until the next annual taxes shall have been collected.

The levy court of Newcastle County was authorized in 1909, to borrow a sum not exceeding $300,000 to be expended for the permanent highways of Newcastle County, bonds to bear interest at a rate not to exceed 4½ per cent, payable semi-annually, the proceeds of the bond issue to be pro-rated among the various hundreds of the county, and the specific roads upon which such apportionment should be expended being set forth in the act authorizing the bond issue, all work to be done under the provisions of the act creating the office of Newcastle County State Highway Commissioner. The levy court was also in 1911 authorized to issue bonds for road improvement for the sum of $200,000 under same conditions as those of 1909.

Kent County

State Highway Officials and Their Duties.—The governor with the consent of the senate, shall appoint a resident of the county as Kent County State highway commissioner, for four years, to receive a salary of $1000 per annum. He shall give bond in the sum of $2000. His duties are identical with those of the Newcastle County commissioner.

Road Revenues and Their Distribution.—The provisions of the laws relating to Kent County follow the same lines as those for Newcastle County.

The levy court is authorized to issue $100,000 of 4 per cent bonds for the permanent improvement of highways, the proceeds to be apportioned among the several districts of the county, as nearly as practicable.

Sussex County

No State highway commissioner is provided for Sussex County, and the State contributes nothing in the way of aid for road improvement, except that $10,000 is appropriated annually for that purpose, without any provision for State supervision or any requirement as to how the money should be expended. An act was passed in 1909, providing for the appointment of a county road engineer, to be placed in charge of the road work, subject to the direction of the levy court.

FLORIDA

Constitutional.—The legislature shall have power to issue State bonds only for the purpose of repelling invasion, or suppressing insurrection or for redeeming or refunding bonds, already issued at a lower rate of interest.

Statutory.—The county commissioners are invested with the supervision of the public roads in their counties and may establish new roads, change and discontinue old ones and keep the same in good repair.

Each county is a road unit and divisions of the county for road purposes are road districts. Each county commissioner district shall constitute a road district.

The county commissioners are required, at their January meeting each year, to appoint three persons in each road district, as commissioners of roads and bridges, who are required to lay off the roads in their respective districts into convenient subdivisions, apportion the hands liable to work thereon and appoint an overseer for each road subdivision.

Taxation.—In counties, not operating under special law, the rate of tax levy which may be assessed for road purposes is increased from 3 to 5 mills on each dollar of assessed valuation; one-half of the amount so assessed against property in incorporated cities and towns shall be paid over to such city or town for use in construction and repair of streets therein.

All able-bodied male residents, between the ages of eighteen and forty-five, residing in any county for thirty days, unless exempt by law, are subject to work on the roads and bridges for not more than five days each year in person, or by able-bodied substitute, or in lieu thereof to pay $1 for each day that he is required to so work.

All lands granted to the State by the United States under 1850 act known as the "Swamp and Overflow Act," for internal improvements, shall be sold by the trustees of the internal improvement funds, and the proceeds placed to the credit of the county road fund, to be used by the county commissioners for the construction of hard surfaced roads.

The commissioners of every county, at a meeting for correcting and reviewing the county assessment, shall determine the amount of money to be raised by tax for county purposes, and may levy a tax of not to exceed 8 mills on the dollar for the purpose of constructing, working, repairing or maintaining roads in the country.

Width of Tires.—The width of tires on vehicles used to haul heavy loads over improved roads in any county in the State shall be as follows: for a two-horse wagon, cart or vehicle 4 inches wide, for a four-horse wagon, cart or vehicle 6 inches wide and for a four-horse wagon, cart or vehicle, used to haul heavy logs or stone, not less than 7 inches. Subject to adoption by the county commissioners.

Convict Labor.—Municipal convicts may be worked upon the streets or public works of such municipality and county convicts may be worked upon the roads in the county. Convicts may be transferred from one county to another upon agreement between the county commissioners of the counties.

Special Road and Bridge Districts.—Upon petition signed by not less than 25 per cent of the registered voters, who are free-holders, residing within any territory, embraced wholly or in part in one or more road districts, petitioning that said territory shall constitute a special road and bridge district for the purpose of improving roads and bridges therein, by the levy of a special tax, or by the issue of bonds, the county commissioners shall order an election to be held within such territory to determine whether or not such territory shall be constituted into a special district. A favorable majority vote is required.

If, at said election, it shall be determined that bonds shall be issued to pay for such improvements, then the county commissioners shall issue the bonds and shall annually levy a tax upon the district to pay the interest and create a sinking fund for their redemption. But, if at the election, it shall be determined to pay for the improvements by special tax the county commissioners shall annually assess and collect a special tax, not exceeding 20 mills on the dollar in any one year, in addition to the county road tax, for the purpose of paying for the improvements. They may also levy a tax to keep the roads in repair after improvements.

Such special districts are entitled to receive their due proportion of the county tax levied for general road purposes.

Automobile Licenses.—The owner or operator of every motor vehicle, operating in the State more than fifteen days, when charge is made for use in any manner or from whatsoever, shall pay to the tax collector of the several counties in which the same may be a county license tax as follows: less than 10-horse power $5, 11 to 29-horse power $10, 30 to 40-horse power $20, 41 to 50-horse power $30, 51 to 60-horse power $50, 61 to 70-horse power $70, 71-horse power and over $100. When such automobile or motor vehicle is used by the owner thereof without charge, its annual license shall be as follows: 10-horse power $3, 11 to 29-horse power $5; 30 to 40-horse power $10; 41 to 50-horse power $15; 51 to 60-horse power $25; 61 to 70-horse power $35; 71-horse power and over $50. The payment of one such county license tax in the State exempts from further liability in other counties of the State. All moneys derived from the payment of such license tax shall be paid into the road and bridge funds of the several counties.

GEORGIA

Convict Labor.—Every crime declared to be a misdemeanor is punishable by a fine not to exceed $1000, imprisonment not to exceed six months, to work in the chain-gang on such public works as the county or State authorities may employ the chain-gang, not to exceed twelve months, any one or more of these punishments in the discretion of the judge.

All male felony convicts, except such as are now required by law to be kept at the State farm, may be employed by the several counties and municipalities upon the public roads, bridges or other public works thereof. On or before February 10 annually, the prison commission shall communicate with the county authorities and ascertain those counties desiring to use convict labor upon their public roads. The convicts shall be apportioned among the counties according to population. Convicts may be awarded to counties other than the one in which the conviction was had. One county may, upon the approval of the prison commission, deliver its quota of convicts to another county, to be used on the roads and bridges thereof, the county so receiving such convicts to have the right to compensate the county from which the convicts come, with work upon its roads, or by the exchange of an equal number of convicts.

The prison commission is authorized, when in funds, to purchase road machinery, appliances and teams, and to equip and organize forces for the construction and repair of roads and bridges in the counties not using their convicts under the preceding sections, when requested by the authorities thereof so to do, the work to be done as nearly as practicable in proportion to the convicts which would have been assigned to each county in case the county had worked its convicts, but as many convicts in addition to said proportion may be worked as any county is willing to pay the expense of, and as the commission may have at its disposal. The county in which convicts are worked shall pay the expenses thereof, including maintenance of equipment and all material required for the work done in the county. If all convicts are not disposed of under the preceding provisions, the prison commission is hereby authorized to place convicts in counties desiring to use them in excess of their quota. If after the counties have been provided with convicts there shall still remain any convicts not otherwise disposed of, then the privileges conferred upon counties herein shall be extended to municipalities, which may hire convicts from the prison commission at the price of $100 per capita per annum.

Any county may purchase, rent and maintain a farm and cultivate same with convict labor in connection with working its convicts on its public roads and bridges, all products and supplies arising from said farm to be used for the support of the convicts, improvement of its public roads and bridges, and in support of county institutions.

All convicts and all convict camps shall be under the direct supervision of the prison commission, which shall prescribe rules and regulations for governing same, subject to approval by the governor, and shall have authority to discharge any employee having either care or charge of said convicts, or said convict camps, and said prison commission shall require the observance and maintenance of sanitary rules and appliances.

The net proceeds from the disposition of convicts to municipalities or otherwise shall be used by the prison commission in working convicts upon the public roads or works of counties not electing to utilize their allotment of convicts, at the option of said commission; and in case said commission shall elect not to work the roads in any one or more of said counties, then the pro rata of said funds for said counties shall be paid into their respective treasuries to be used for road purposes only.

Not to exceed four supervisors may be employed by said prison commission, if same shall be deemed necessary, who shall visit the various counties, inspect the convicts and their work, and perform such other duties as may be required of them. If practicable, civil engineers shall be selected for these positions, and the salaries shall not exceed $150 per month and actual traveling expenses. The commission shall also appoint such wardens and guards as may be necessary, and the pay of a guard shall not exceed $50, and that of a warden $100 per month.

Local Road Legislation.—The board of county commissioners or the ordinary of each county has jurisdiction of the roads therein, and shall divide the county into road districts and appoint three road commissioners for each district, who in turn appoint road overseers.

All able-bodied males, not exempt by law, shall be liable to four days' labor on the public roads or to commute for same by paying $3 in cash to the overseer.

The commissioners of roads and revenues or the ordinary may levy a tax of not more than 20 cents on each $100 for roads.

The legislature in each case must authorize a bond issue by special enactment submitting it to the people.

IDAHO

The legislature in appropriating money for highways, has provided for the appointment of a separate commission for each piece of the work. Generally the State engineer is made a member of these commissions.

State Highway Officials.—The State highway commission is composed of the governor, State engineer, and State mining inspector. The commission has control and supervision over all roads, bridges and trails constructed in whole or in part at the expense of the State. The members shall serve without pay but are allowed actual and necessary expenses. They shall make an itemized report to the State auditor on the first day of June and January of each year.

When any road or trail is in serious need of repair the commission shall have the same inspected and the inspector shall make the report to the commission in writing. The commission shall then notify the county commissioners of the nature of the work necessary to put the road or trail in condition. If the county commissioners fail to make repairs by given time the commission is authorized to lease the road and permit the collection of tolls specified in the lease, for a period not to exceed five years.

State Highway Funds.—The legislature makes its appropriations from time to time for the improvement or construction of specific roads or bridges designated in the appropriation act.

Local Road Legislation.—Jurisdiction over roads vests in the county commissioners, who divide the county into suitable road districts. A road overseer is elected annually for each road district.

Every able-bodied male, between twenty-one and fifty years of age, shall perform two days labor on the public roads, or commute for same by paying $4 in cash.

The county commissioners shall annually levy a road tax of not less than 10 nor more than 60 cents on each $100. The board may also levy a special road tax of not to exceed 10 mills on each $1, which may be paid either in cash or labor.

ILLINOIS

State Highway Commission.—The governor shall appoint three persons as a highway commission, two of whom shall belong to the political party casting the highest number of votes at State election, all of whom shall hold office for two years unless sooner removed for cause. The governor shall designate one of the commissioners as chairman for two years. The commission shall be provided with the necessary appliances and supplies and report annually to the governor.

The commission shall investigate the best methods of road construction and repair, and determine upon the methods best adapted to the various sections and soils of the State. It may be consulted by county, city, village or township officers having authority over roads and highways.

The members of the commission serve without pay, but receive their actual expenses while officially engaged. The commission appoints a State highway engineer, who receives reasonable compensation for his service and his actual traveling expenses when officially engaged.

Convict Labor.—Convicts may be used to manufacture road building material to be furnished free; and in the manufacture of road machinery, tools and necessary appliances. The authorities of the counties may make application to the State highway engineer for these things, obligating themselves to use the same according to regulations formulated by him.

County bonds may be issued on a vote of two-thirds of the qualified electors of the county. Such indebtedness shall not run to exceed twenty years.

Special good road districts may be formed and on favorable vote of two-thirds of the electors thereof bonds may be issued not exceeding 25 per cent of the assessed value of real property.

Local Road Legislation.—In counties under township organization the township commissioners of highways, three for each township, have charge of the roads and bridges in the respective towns and may employ a general superintendent, appoint overseers, employ laborers or let the work to contract.

In counties not under township organization the county commissioners divide each county into road districts. In each such road district three commissioners of highways and one district clerk are elected and the commissioners of highways may appoint a general superintendent of roads, overseers, employ laborers or let the work to contract.

In counties under township organization the township commissioners of highways shall levy a road tax not to exceed 36 cents on each $100 of real, personal, and railroad property in the town; and, in case of emergency, they may, upon written consent of a majority of the board of town auditors, levy an additional tax of not to exceed 25 cents on each $100 of taxable valuation.

For road damages they may levy an additonal 20 cents. The above applies if township is under cash system.

If under labor system a levy of 25 cents is made to be worked out. An additional 25 cents may be levied under the emergency clause and a further levy of 25 cents may be made for purchase of tools, machinery, materials and bridges.

Every able-bodied male between twenty-one and fifty years of age, outside incorporated cities and towns, shall pay a poll tax of not to exceed $2 each year, all of which above taxes shall be paid in money.

In counties not under township organization, the commissioners of highways of the districts therein may annually levy a road and bridge tax of not to exceed 30 cents on each $100 of taxable valuation. And for road damages an additonal tax of 12 cents on the $100.

In addition, every able-bodied male between twenty-one and fifty years of age, not exempt by law, outside incorporated cities and towns, may be required to work on the roads not more than three days each year, or commute for same at the rate of $1 per day.

Townships and districts, upon favorable vote of a majority of the legal voters, may borrow $35,000 for building gravel, macadam or other hard roads, and may issue ten-year 5 per cent bonds for such indebtedness. In addition may vote a five year tax not to exceed $1 on the $100 for construction of hard roads.

INDIANA

Constitutional.—No law shall authorize any debt to be contracted on behalf of the State, except to meet casual deficits, to pay the interest on the debt, and to repel invasion or suppress insurrection.

No political or municipal corporation in this State shall ever become indebted in any manner or for any purpose to an amount in the aggregate exceeding 2 per cent of the value of the taxable property within such corporation, provided that in tine of war, foreign invasion or great public calamity larger indebtedness may be created upon petition of a majority of the property owners.

Statutory.—The commissioners of each county are constituted a board of directors for all free gravel, macadam and turnpike roads in such county. They may divide the free turnpikes in each district and appoint a superintendent for not less than 10 nor more than 15 miles of free gravel road therein.

Generally the control of highways vests in the county commissioners and the township trustees. Each township is divided into districts and the qualified voters in each such district, every two years, elect a supervisor of roads, at a compensation of $2 per day for not exceeding 60 days in any one year.

Taxation.—The county commissioners shall annually levy on all taxable property in the county, not to exceed one cent on the $100 of valuation, for every 10 miles of free gravel, macadam or turnpike roads completed in such county, the proceeds to be paid into the gravel road fund and used for their repair.

A tax of 30 cents on each $100 valuation is levied annually by the township trustees on the property within each township, and 10 cents additional may be levied for bridges and culverts with the consent of the township advisory board.

All able-bodied male residents of the district, between twenty-one and fifty years of age, unless exempt by law, are required to work not less than two nor more than four days each year upon the roads. Said labor may be commuted by the payment of $1.50 for each day's work so required, or an able-bodied substitute may be furnished.

Bond Issues.—Road bonds may be issued by the county commissioners to an amount not exceeding 2 per cent of the assessed valuation of the county. When bonds are issued a tax sufficient to meet the interest and create a sinking fund shall be levied upon the property in the township, within which the proceeds of the bonds are expended.

Width of Tires.—It is unlawful for any one to haul over any turnpike, macadam or gravel road when the same is thawing through or is in condition to be cut up, a load of more than 2500 pounds, including driver and vehicle, on a tire of less than 3 inches in width, nor more than 3000 pounds with tires between 3 and 4 inches, nor more than 3500 pounds with tires between 4 and 5 inches, nor more than 3800 pounds with tires over 5 inches. A fine of from $5 to $50 is fixed for violation of this provision.

Convict Labor.—All able-bodied prisoners sentenced to any county jail or work-house may be put to work on the public highways.

Toll Roads.—The county commissioners are authorized, on petition of a majority of the voters of any township in which any toll road is located, to acquire such road and may issue bonds to pay for same and levy a tax to meet the interest and create a sinking fund for redemption of such bonds. Such roads, when acquired, shall be free from toll and be kept in repair as free gravel roads.

Free Gravel Roads by Assessment.—The county commissioners of every county have the power to lay out, construct or improve by graveling or macadamizing any public highway upon the presentation of a petiton stating the kind of improvement desired and the points between which the same is asked, signed by a majority of the resident land owners whose lands lie within one mile of the proposed improvement, and such majority shall represent a majority of the acres owned by said residents. The board after it has been satisfied that due notice of application has been given by publication, shall appoint three disinterested free holders of the county as viewers and a competent surveyor or engineer to examine and lay out such highway as in their judgment public utility may require. Viewers shall determine what lands will be benefited or damaged by the proposed improvement and if they find that the costs and damages caused thereby will be less than the benefits to the lands within two miles of the improvements they shall apportion the estimated costs and damages upon all lands within two miles that will be benefitted, according to the benefits derived therefrom. They shall than make a complete report to the board of commissioners. No lands shall be assessed for benefits that do not lie within two miles of contemplated improvement nor lands within incorporated towns or cities. A time shall be fixed for a hearing of the report at which time the board of commissioners may enter upon its records an order that the improvement be made. Provision is made by the laws for remonstrances by owners of lands affected. If the assessment upon the lands of any remonstrant is not reduced 20 per cent or the damages claimed are not increased 20 per cent, such remonstrant shall pay the costs of such remonstrance. If the assessment is reduced more than 20 per cent and the damages increased more than 20 per cent, he shall recover costs to be pro-rated upon the lands assessed for benefits.

After the improvement has been ordered and the assessments confirmed, the board of commissioners shall appoint a superintendent who shall execute a bond in double the amount of the assessments, and whose duty it shall be to execute the work authorized. He shall let contract for such construction in whole or in part. As soon as the contract or contracts are let the superintendent shall assess the lands benefitted in accordance with the action of the commissioners such sum as may be necessary to pay for the work.

Bonds may be issued to pay for such gravel road construction provided the owners of lands assessed for benefits shall within thirty days from the establishment of the work file their written request therefor with the superintendent of construction. The superintendent of construction shall ascertain the total cost for the work and shall apportion such cost to the several tracts of land assessed and shall report to the board of commissioners all such sections together with requests for bonds, etc., which the board shall examine and if found correct shall approve. They shall then direct the county auditor to prepare an assessment sheet gravel road duplicate and the auditor shall assess on such land from year to year a sum sufficient to pay the bonds and interest as they mature. As soon as the duplicate is so prepared the board of commissioners shall issue the bonds of the county, said bonds to be payable annually for ten years and to bear interest at six per cent per annum payable semi-annually and shall be payable out of collections made on such assessments.

When the work of improving such highway is completed and the superintendent shall certify the same to the auditor of the county, the board of commissioners shall provide for keeping such roads in repair.

Into adjoining County.—When it is desirable to continue such highway improvement into or through an adjoining county the same proceedings shall be had in such county as were had in the county where the improvement begins.

All highways improved under the preceding sections shall be free of toll.

Free Gravel Roads by Taxation.—The county commissioners when petitioned by fifty freeholders shall after publication submit to the voters in the township or townships or city the question of building such roads or road as are petitioned for. If a majority are in favor, the commissioners shall at once proceed to the construction of the same. The commissioners before the election is held shall appoint a surveyor and viewers to locate the road and make profile, determine quality of materials to be used, make estimates, etc. As soon as the election returns have been made in favor of such road and all claims filed for damages have been settled, the commissioners shall advertise for bids for building the road and no contract shall be let for a bid higher than the estimates made by the viewers. The commissioners shall issue county bonds in 40 equal series, the first payable in six months and the remainder at equal intervals, bearing interest not higher than 4 per cent per annum payable semi-annually. To meet said bonds and interest, the commissioners shall levy a tax upon the property of the township including towns and cities if such there be, of less than 30,000 inhabitants in which such road is located. All such roads shall be free of toll and shall be kept in repair the same as other free gravel roads. The commissioners are required to appoint a competent superintendent to supervise the construction of such road and his compensation shall not exceed $2 per day for time actually employed. It shall be unlawful for any county commission to issue bonds for the construction of free gravel or macadamized roads when the total issue, including bonds already issued, is in excess of 4 per cent of the total assessed taxable valuation of the township.

IOWA

State Highway Commission.—The Iowa State College of Agriculture and Mechanical Arts at Ames acts as a highway commission for Iowa, whose duties shall be:

1. To devise plans and systems of highway construction and maintenance, suited to the needs of the different counties of the State, and demonstrate such highway construction, at least once each year at some suitable place, for the instruction of county supervisors, township trustees, superintendents, students of the college, and others.

2. To disseminate information and instruction to county supervisors, and other highway officers who make request, answer inquiries and advise such supervisors and officers on questions pertaining to highway improvement, construction and maintenance, and when the supervisors of a county adjudges that the public necessity requires a public demonstration of improved highway construction or maintenance in said county and so requests and agrees to furnish necessary tools, help and motive power for same, the commission shall furnish as soon as practicable thereafter, a trained and competent highway builder for such demonstration, free to the county.

3. To formulate reasonable conditions and regulations for public demonstrations, and to promulgate advisory rules and regulations for the repair and maintenance of highways.

4. To keep a record of all the important operations of the highway commission, and report same to the governor at the close of each fiscal year.

The county board of supervisors, consisting of three to seven men for each county, have control of the bridge funds, a portion of the road funds and the automobile tax license.

The township trustees, consisting of three men for each township, have control of the township road fund and the township drag fund.

General Road Funds.—The county bridge fund is levied to build all bridges except the small township culverts. The county road fund is used for road work under county direction.

The township road fund is used for grading and drainage of roads and small culverts under township direction. There is now a special road drag fund which will amount to $300, more or less, per township annually which can be used for road dragging only.

The Basis of Taxation.—The taxable valuation of all property is taken at one-fourth of the assessed valuation. The county road fund maximum levy of 5 mills on all property within the county except that included in cities of first class. County road fund, 2 mills on taxable valuation of all property in county outside of incorportated towns and cities. Township road fund, 3 mills. Township road drag fund, 1 mill.

KANSAS

State Aid.—No State highway department has been provided by law but the office of State engineer established at the Agricultural College is furnishing advice and plans and specifications for roads and bridges and drainage and irrigation and giving the work general supervision. About $6000 per annum is alloted for salaries, office supplies and equipment from the State appropriation for the extension service of the college.

The Constitution of the State provides "That the State shall never be a party in carrying on any works of internal improvements," so that until this section of the constitution is amended no State aid for the construction of roads and bridges can be granted.

Classification of Roads.—All roads of every county in the State shall be classed according to their relative importance as "State roads," "county roads," "mail roads," and "township roads." The "State roads" shall be all roads laid out and defined by the State of Kansas. The "county roads" shall be all roads designated as such by the commissioners of a county, who shall, as soon as practicable, name as such county roads direct highways connecting cities and market centers, whether both such cities and centers are within the county, or one is within and the other without such county. Free delivery mail routes shall be known as "mail routes," and all other public highways within a township are "township roads." All county and State roads shall be maintained at the expense of the county, and all mail routes and township roads where they do not coincide with county and State roads at the expense of the township in which they are situated.

Administration.—The units of administration are the counties and township; the county commissioners have authority over State and county roads.

In all counties, if in the judgment of the county commissioners, the county surveyor be competent to superintend the county and State roads, such surveyor may be the county engineer of public highways and bridges; but if the board of county commissioners shall deem the county surveyor incompetent for such work within the State, the board may appoint some person other than the county surveyor county engineer of public highways and bridges.

The county engineer shall have general supervision of all county road and bridge work in the county, under the authority of the board of county commissioners, and of all mail routes and township roads under the direction of the township trustees and the highway commissioners in the various townships of the county.

The county engineer or the county commissioners of any county may utilize the advice and scientific knowledge of the State engineer of roads and highways at the State Agricultural College at Manhattan, and it is made the duty of the State engineer and the State Agricultural College to furnish all such advice and scientific knowledge without charge and expense to the county engineer or to the county commissioners requiring the same.

The township trustee, clerk and treasurer of each municipal township in the State shall constitute a board of commissioners of highways and township auditing board for their respective townships. All mail routes and township roads shall be under the control of said board of commissioners of highways. The township board shall appoint one or more overseers for all mail routes and township roads in the township, who shall work the roads for as many days each year as the said highway commissioners and the engineer may direct.

The highway commissioners shall keep in repair and improve as far as practicable all roads under their direction. They may employ a superintendent, outside of their own body, and may let contracts and employ laborers, or entrust the same to the control of the county engineer.

The county engineer and highway commissioners shall determine where and when the road work shall be done upon all mail routes and township roads, and the board of county commissioners and the county engineer shall perform the same service in regard to State and county roads.

With the approval of the highway commissioners the township trustee shall determine what mail routes and township roads can be dragged and shall each year arrange with some person or persons to drag the same at such times and upon such terms as may be directed, not exceeding 75 cents per mile for each dragging, nor more than $10 per mile for any one mile per year for the dragging of such roads. The county engineer, with the approval of the board of county commissioners, shall determine what State and county roads can be dragged and shall arrange for the dragging of same at the same rate of cost as prescribed for mail routes and township roads.

Revenues.—Taxes assessed for the purpose of constructing and maintaining public roads and highways shall be paid in cash and collected, as provided for in relation to other taxes.

The county commissioners of each county may levy a road tax for county and State roads and bridges of not more than 1 mill on the dollar on all taxable property in their respective counties; provided that upon the majority vote at an election called for the purpose in such county, the tax levied may be increased not to exceed 3 mills for such road purposes; provided, that the county commissioners shall, within the limit of 1 mill on the dollar, keep all State and county roads within their respective counties in first-class condition.

The highway commissioners shall recommend to the county commissioners of each county in the State on or before August 1, a levy of not more than 3 mills on the dollar, on all property in such township, and it shall be the duty of the county clerk to place such levy on the tax rolls; provided, that at least 75 per cent of all moneys collected from such levy in each township shall be used to improve the rural route and township roads therein.

Male persons between the ages of twenty-one and fifty years shall be liable each year to pay the sum of $3 to the township trustee or to the proper officer of the city in which such person lives, and the same shall be expended on the public roads within such township or city.

Convict Labor.—It is the duty of the warden of the penitentiary to employ the surplus convict labor in extending and repairing the State and county roads.

By virtue of a special act of the legislature, a macadam road has been provided for from Leavenworth to Kansas City. The bill granting authority for this work provides that if Wyandotte and Leavenworth Counties furnish the right-of-way and material, the State will furnish the necessary labor from the penitentiary; estimated cost is $100,000.

KENTUCKY

Constitution.—The credit of the commonwealth may be given to any county for public road purposes, and any county may incur indebtedness not to exceed 5 per cent of the value of the taxable property, for public road purposes; provided, such additional indebtedness is approved by the voters of the county at a special election, and that when such indebtedness is incurred, the county shall levy an additional tax not exceeding 20 cents on $100 for the paying of interest and providing a sinking fund.

Local Road Administration.—The county is the unit of administration, the county or fiscal court having jurisdiction over all roads.

Taxation.—In counties of less than $3,000,000 assessed valuation, an election may be called to determine whether a tax not exceeding 25 cents on each $100 shall be levied therein for road purposes, a two-thirds vote being required to carry such an election.

A poll tax of $1.50 may be levied upon all males of twenty-one years of age and may be applied to the maintenance of the public roads of the respective counties.

If the fiscal court so decides any tax-payer may work out his road and bridge taxes upon the same terms and compensation as other hands who perform road work.

Bond Issues.—The fiscal courts are authorized to permanently improve the roads of their respective counties by contract or otherwise and they make special levy or issue bonds to bear interest not to exceed 6 per cent and to run not more than thirty years. If 150 voters petition the courts an election shall be held on the question of issuing bonds. A two thirds majority is required after which the fiscal courts shall issue the bonds, which bonds shall be exempt from taxation. A tax shall then be levied not to exceed 20 cents on the $100 of assessed valuation of the county which shall be applied to the payment of interest and the creation of a sinking fund for the redemption of the bonds.

The fiscal court may cause the most important roads to be laid out in sections of not more than two miles in length and let to contract the construction and maintenance of such sections, the expenses to be provided for by a poll tax of $1 and a tax of not to exceed 25 cents on each $100 of taxable property in the county.

Toll Roads.—Upon the written application of 15 per cent of the vote cast at the last preceding general election in any county, the county judge thereof shall order an election to be held at the next regular county election therein upon the proposition of having free turnpikes and gravel roads. If the people so decide by such election, the fiscal court may acquire by gift, lease, purchase or condemnation any or all of the turnpike roads within the county and may provide for the construction of new ones, and may levy taxes each year not exceeding 25 cents on $100 to pay for and maintain such roads. Such roads shall then be maintained by the fiscal court and be free from toll.

An act approved March 15, 1912, provides for the transfer of any stock owned by the State in turnpike companies or tollroads to any counties that may purchase such toll roads and operate them as free roads

The fiscal courts are authorized to take stock in turn-pike and toll bridge companies not to exceed $100 for each mile of turnpike and 30 per cent of the cost of toll bridges. The rates of toll to be charged are prescribed in the act.

License tax on automobiles is placed to the credit of the State road fund.

Convict Labor.—Persons sentenced to confinement in the penitentiary shall be confined at labor within the walls of the penitentiary, and the general assembly shall not have the power to authorize their employment elsewhere, except upon the public works of the commonwealth.

All male persons confined in county jails or workhouses under sentence of hard labor are available to the supervisor or overseer to work on public highways. The supervisor or overseer shall be responsible for the safe keeping of such convicts while in their care and the convicts shall be governed, controlled and cared for by the said supervisor or overseer in the same manner as required by law of the superintendents of workhouses and the prisoners shall receive credit for work, as provided by law.

State Aid and Supervision.—An act approved March 11, 1912, provides for the establishment of a department of public roads. The governor is required to appoint on July 1, 1912, and every four years thereafter a state commissioner of public roads who shall be a graduate in civil engineering and have had at least five years experience in civil engineering, and who shall receive a salary of $3000 per annum. The said commissioner is authorized to employ additional engineering and clerical assistance, with the approval of the governor. All salaries and expenses are chargeable to the State road fund and shall not exceed $25,000 per annum.

The commissioner on request of the county courts may recommend rules and regulations fixing the duties of county road engineers and their employees and advise with the county road engineer in the establishment of grades and in the construction, improvement and maintenance of roads and bridges. He is authorized to collect and disseminate information, hold meetings etc., and is required to report to the governor biennially.

For construction or repair of a bridge involving an expense of more than $500 the State commissioner of public roads shall furnish plans, specifications and estimates of cost, but it shall not be obligatory on the part of the fiscal court to accept such plans, specifications and estimates. The same procedure is required to be followed in purchasing county road machinery where the amount involved is $500 or more. Where a hard surfaced road is to be constructed the said commissioner of public roads is required to send an assistant engineer to aid in making surveys, drawing plans and specifications and making estimates. The county road engineer is not compelled to accept such plans and specifications but shall make them public.

County Road Engineer.—An act approved March 18, 1912, provides for the office of county road engineer to be appointed by the county judge with the consent of the fiscal court on or before October 1, 1912 and every two years thereafter. The said engineer shall be a reputable engineer or have had practicable experience as a road builder for two years and have passed a creditable examination given by the State commissioner of public roads. He may be removed by the county judge for incompetency or malfeasance in office on written charges after hearing. He shall have charge of all public roads and bridges within the county except turn-pikes and toll bridges. He shall, with the consent of the county judge, employ assistants in the different precincts of the county and may summarily discharge such employees at pleasure. He may fix their compensation and prescribe their duties. He is required to lay out and divide the county roads into sections not exceeding two miles in length which he shall number and record specifying in the record what he deems necessary for the improvement and repair of each section for the ensuing year.

He is authorized, with the approval of the fiscal court, to purchase gravel beds, stone quarries, road machinery, etc. Upon the order of the State commissioner of public roads the county road engineer shall cause all public roads within his county to be measured and shall make report to the State commissioner of public roads.

If any county road engineer directly or indirectly attempts to influence any voter in the state for or against any candidate or any question at issue he shall be fined not less than $20 and not more than $100 for each offense.

LOUISIANA

Constitutional Amendment.—A joint resolution was adopted in 1912 proposing an amendment to the constitution to be voted upon in November 1912 authorizing police juries to form their parishes into road districts and to set aside at least one mill per annum of the taxes and to impose a per capita tax of not more than $1 and a vehicle tax of from 25 cents to $1 for constructing and maintaining roads. The amendment also provided that other taxes not to exceed 5 mills may be levied for roads and bridges and that the parishes may incur debt and issue bonds. Another joint resolution provided that subdivisions of the State might issue bonds for road improvement and collect a tax, in addition to all other taxes, sufficient to pay interest and principal, not to exceed 10 mills on the dollar in any year, the total issue not to exceed 10 per cent of the assessed value of property. (The amendments to the constitution were ratified at the general election in November, 1912.)

State Highway Officials.—The board of State engineers is authorized to appoint a State highway engineer who holds office until removed for cause by the board. He must be a competent civil engineer, experienced in highway work and his salary shall not exceed $5000 per annum, at the discretion of the board. He shall also be required to give bond.

Duties of State Highway Engineer.—The board is authorized to appoint assistants and clerks and provide offices. It holds meetings in its discretion to consider the general policy and the work of the department, and to receive the annual report of the State highway engineer. The board acts in all matters concerning recommendations, estimates and appropriations found advisable to be submitted to the governor.

The State highway engineer has charge of all records, plans, specifications, etc. He is required to make a general highway plan of the State; collect statistics; investigate methods best adapted to each section of the State; establish standards for construction and maintenance; determines character, and has supervision over construction and maintenance of State highways in each parish granted State aid, subject to approval of board of State engineers. He or his assistants must make all surveys, plans, specifications and estimates and select materials for said State aid roads. When amount of improvements is over $2000, bids must be advertised for, to be accompanied by certified check for 5 per cent of bid. State highway engineer may reject any or all bids for cause and do the work with his own force, but otherwise must award to lowest responsible bidder. The president or some member of the police jury may be present when bids are opened. Successful bidder must give bond to the amount of one-half of the contract awarded. No bidder accepted as bondsman. State highway engineer, with the approval of board of State engineers, may purchase for the State, rock crushers, steam rollers and other road machinery, also draft animals and supplies necessary, and may loan such equipment to parishes provided they bear all expenses. He may also employ such labor as he may deem necessary. He is required to take up applications for State aid as far as practicable in the order of their receipt, but he must first determine whether parishes applying have the necessary funds. Contracts must be in the name of the State and signed by the highway engineer and the contracting parties, with the approval of the president of the police jury of the parish. The State highway engineer may authorize partial payments to the contractor not to exceed 80 per cent of the contract price of work as it is completed, but at least 20 per cent shall be held until work is accepted. Upon completion of contract the State highway engineer certifies to the State treasurer and the president of the police jury the portion to be paid by the parish.

Maintenance.—The State highway engineer is required to keep all roads improved under this act, in repair, the total cost to be paid by the State and the parish to reimburse the State in the same manner as for construction. The State highway engineer is required to organize a system of repair so that the roads shall be in good condition at all times.

Duties of Local Officials.—Police juries of parishes have jurisdiction over roads and may make application to State highway engineer for State aid for main traveled roads. Police juries must be notified by State highway engineer the time for opening bids, the president or some other member may be present to concur. Proportion of cost of State aid roads must be paid by police jury within thirty days. Contracts made by State highway engineer must have written approval of the president of the police jury of parish. Parish must reimburse State for its proportion of cost of maintenance in the same manner as for construction. Rights of way must be acquired by parish, by purchase, donation or expropriation. In expropriating lands for right of way the measure of damages to such land owner shall be double the assessed value of the property per acre appearing on the last assessment rolls.

State Aid Funds and Distribution of Cost.—Total cost under provision of this act to be paid by State treasurer on warrant of State highway engineer approved by president of board of State engineers. The parish is required to refund one-half of the cost of construction and maintenance. In order to provide funds to carry out this act all surplus revenues received by the oyster commission and the game commission and from any State vehicle tax and all other revenues which may be appropriated or designated for the purpose constituting "the State highway fund." Any portion of this fund unexpended in one year may be expended the next fiscal year. The fund shall be apportioned by the said State highway engineer, by and with the approval of board of State engineers. A general property tax of one-fourth of 1 mill is levied by the State and the proceeds placed in State highway fund.

Convict Labor.—The State highway engineer, with the approval of the board of State engineers, may under certain conditions and circumstances use convicts for highway work, such convicts to be under the supervision and guardianship of the board of control of the State penitentiary. The labor performed to be furnished free of charge, but the cost of maintenance and operation to be borne by the parish, municipality or road district having the work performed and paid out of the fund available for said work.

Local Revenues.—For the purpose of paving and improving roads, a municipal corporation, drainage district or parish may submit to vote the question of levying a special tax or issuing bonds for that purpose. Such tax shall not exceed 5 mills on the $1 in any year. If bonds are issued their amount shall not exceed one-tenth of the assessed valuation.

Every able-bodied male, between eighteen and fifty years of age, unless exempt by law, may be required to work, not exceeding twelve days annually, on the public roads, or to commute for same at the rate of $1 for each day's work so required.

MAINE

State Aid.—The State aid law provides for a system of State roads to be improved through coöperation between the State and the municipality. When any town votes to accept State aid the county commissioners in the county in which the town is located, on or before June 1, shall determine the main traveled thoroughfare of the town and designate it as the State road and they shall return to the State commissioner of highways a careful description of each road so designated. Upon petition to the State commissioner of highways and hearing thereon, the location of the State road by county commissioners may be changed. When the State road in any town has been reconstructed in a permament manner the county commissioners shall then designate the next important main thoroughfare as State road.

If any city, town or organized plantation, or the county commissioners, acting for unincorporated townships, desire State aid for the improvement of State roads they shall raise an amount in addition to their regular road revenue as follows: towns having a valuation of $200,000 or less may appropriate any amount not exceeding $200; towns having a valuation of $200,000 and not over $800,000 may appropriate any amount not exceeding $400; towns having a valuation over $800,000 and less than $1,000,000 may appropriate an amount not exceeding $450; and towns having a valuation of $1,000,000 and not exceeding $3,000,000 may appropriate an additional $50 for each $200,000 additional valuation or fraction thereof; towns having a valuation of $3,000,000 and les- than $4,000,000 may appropriate $1000; and towns having a valuation of $4,000,000 or more may appropriate an additional $100 for each $1,000,000 additional valuation or fraction thereof. The commissioners of each county in which are located unincorporated townships shall if they desire State aid for said townships raise in addition to the regular road revenue 50 cents for each $1000 of valuation in said townships. City governments may make appropriations to secure State aid.

Applications for State aid shall be made to the State commissioner of highways on or before April 15 of each year by the clerks of cities, towns, plantations or boards of county commissioners except that in cities the time may be extended to June 15. The voters shall deternine at the annual town meeting whether or not they will make the necessary appropriations of money to entitle the town to State aid.

The State commissioner of highways shall apportion the money appropriated by the legislature for State aid to the cities, towns and organized plantations which have applied for State aid and appropriated the additional amount necessary to secure such State aid as follows: for each $1 so appropriated by towns having a valuation of $200,000 or less, $2; the towns having a valuation of over $200,000 and less than $1,000,000, $1 for each $1 appropriated by said towns; towns having a valuation of $1,000,000 and less than $1,200,000, 92 cents; towns having a valuation of $1,200,000 and not exceeding $1,400,000, 85 cents; towns having a valuation of $1,400,000 and not exceeding $1,600,000, 80 cents; and to towns having a valuation of $1,600,000 and over, 75 cents for each $1 so appropriated by said towns. Each unincorporated town shall receive $1 for each $1 appropriated. On or before May 15 of each year the officers having jurisdiction over highways which are to receive State aid shall file with the State commissioner of highways a proposal setting forth the location on a State road and the nature of the improvements desired to be made, and such proposal shall be subject to the approval of the State commissioner of highways. If he approves the same he shall issue specifications and no State aid shall be paid until the work undertaken has been constructed to his satisfaction.

He may furnish an engineer or inspector to towns free of charge; any special expenses incurred in providing such engineers and inspectors shall be paid out of the general appropriation for State aid. The selectmen of towns shall file statement with the commissioner of highways upon the completion of the State road showing the cost of the road, and survey notes, copies of all plans and contracts and other records. Any part of said joint fund not expended during the year in which it is apportioned may be expended in the succeeding year.

The State commissioner of highways may make surveys, plans, estimates and specifications for the proposed improvement where the amount to be expended is $1000 or more and shall forward the plans and specifications to the selectmen whose duty it shall be to advertise for bids. Towns may bid upon the work within the town and shall submit their bids to the State commissioner of highways and shall be subject to all the requirements made of the other bidders except that they shall not be required to submit certified check with their bid or give bond. State commissioner of highways may appoint inspectors if he deems it necessary, and their salary shall be charged against the joint fund.

Maintenance of State Roads.—Any highway improved as a State highway by the expenditure of the joint fund shall be maintained by the city, town, plantation, or township, to the satisfaction of the State commissioner of highways.

State Highway Department.—There is a State highway department whose chief officer is called the State commissioner of highways. He shall be a civil engineer appointed by the governor. His term of office shall be four years and he shall receive an annual salary of $2500 and his actual expenses, not to exceed $1500 annually. He may appoint, subject to the approval of the governor and council, an assistant commissioner who shall be a civil engineer experienced in road building and may employ such other help as the execution of this act shall make necessary. The State commissioner of highways shall compile statistics, disseminate information, hold meetings and make annual report to the governor and council, showing number of miles, cost and character of roads built, etc.

Appropriations for State Aid.—An appropriation of $250,000 per annum is made for the purpose of carrying out the purposes of this act. After providing for the payment of State aid applied for, the balance of the fund may be expended by the State commissioner of highways in improving the main thoroughfares of through travel in the State with the object of establishing a complete system of continuous main highways throughout the State, the location of such main highways to be determined by the State commissioner of highways subject to the approval of the governor and council.

Main Trunk Line State Highways.—A designated route is described upon which the State commissioner of highways is directed to expend such moneys as may be available from time to time, the route beginning at Kittery and running through a number of towns to Fort Kent the northern terminus. Another route is designated beginning at Portland and running through a number of towns to Augusta connecting there with the first designated route.

General Road Laws.—The unit of road administration in Maine is the township which, generally speaking, is 6 miles square. For municipal purposes, townships are incorporated either as cities, towns or plantations. There are also unincorporated townships in the unsettled portions of the State. All funds for the improvement and maintenance of roads and bridges are raised by an annual cash tax upon all property within the township in which the roads are located. In cities the amount is determined by the city government; in towns and plantations the amount is determined by the voters at an annual town meeting; in unincorporated townships the amount is determined by the county commissioners of the county in which the township is located.

Improvements are determined upon in cities by a vote of the city government after a recommendation by the committee on streets of the city. The work is under the direction of the superintendent of streets. He hires men and teams, makes up pay rolls and approves them, and purchases small supplies. Purchases of any importance are made by the committee on streets. In towns, the board of selectmen (in plantations the board of assessors, there being no selectmen) decide on what improvements shall be made, and purchase all material and equipment of any consequence. Road work is under the supervision of the road commissioner, elected at the annual town meeting. He hires men and teams and purchases small tools and supplies if directed to do so by the selectmen. In unincorporated townships the county commissioners determine what improvements shall be made, purchase such equipment and material as is necessary, and the work is done under the supervision of an agent appointed by them.

County commissioners may lay out, alter, or discontinue highways leading from town to town, or grade hills in such highways. They may also be called upon to define the bounds of such a highway when, for any reason, the bounds have become obliterated or obscured. In either of these cases, they make record of their proceedings, and the road is then known as a county road, although the county bears no part of the expense of construction or maintenance of the road.

Municipal officers of cities, towns, and plantations may lay out, alter or discontinue roads which are of purely local importance. The initiative is by petition of a certain number of citizens, and before the proceedings are complete the municipal officers must make record of their doings and return the proceedings to, and have them approved by, a town meeting regularly called. In case the municipal officers refuse to act on a petition, an appeal may be taken to the county commissioners, and they have the jurisdiction which originally vested in the municipal officers.

Occasionally, the opening and construction of a new road, or the construction of a bridge of considerable magnitude, or any other extraordinary road expenditure, is passed upon by the voters at the annual town meeting, or at a special town meeting called for the purpose.

The statute-labor tax was abolished in 1897.

MARYLAND

State Roads Commission.—State road work in Maryland was begun by the act of 1898, when an annual appropriation of $10,000 was made payable to the Maryland geological and economic survey (established in 1896) enabling the Survey to investigate the existing road conditions in Maryland, and to furnish plans, expert advice and supervision to the counties of the State. A State aid law appropriating $200,000 annually was passed in 1904, and its administration placed in the hands of the Maryland geological and economic survey. Under this act, the counties were further encouraged to attempt modern road work through the financial aid of the State to an extent of one-half the cost of such work, In 1906, the legislature made a further appropriation of $90,000 to be applied by the Maryland geological and economic survey to the improvement at the expense of the State alone, of the direct route between Baltimore and Washington, which was called in the act State road no. 1, and subsequent legislatures have added several times the original appropriation to this same fund for the purpose of completing the improvement of this road.

In 1908, the legislature authorized the construction by the State of a system of main artery roads in and through all counties at the expense of the State alone, and provided for a bond issue by the State of $5,000,000 toward this end. In 1910, the legislature added another $1,000,000 for the purpose of covering the cost of construction of a direct route from Baltimore to Annapolis and the cost of several inter-county bridges necessary to make the original system effective in certain localities.

The act of 1908 created an independent road commission of six members to be appointed by the governor for the carrying out of the work under the State road loan, one-half of the membership to represent the geological survey. The act of 1910 relieved the geological survey of all road work and placed, after June 1,1910, the administration of the State aid law and the Baltimore-Washington road act in the hands of the State roads commission. At the same time, the act of 1898, which covered an appropriation of $10,000 for technical advice and assistance, was repealed. At the time of the transfer of the work of the geological and economic survey to the State roads commission, over 350 miles of road had been surveyed, and plans and estimates had been made on 275 miles of these, aggregating something over $2,000,000. Of this mileage, 146½ miles had been accepted as completed from the contractors, while 46.38 miles were still under contract and in various stages of construction, but on the average more than 50 per cent completed. In addition several miles of road had been built for the counties through the supervision of the survey, but at the request and expense of the counties themselves. The work on more than 200 miles had thus been inaugurated and for the most part completed by the geological and economic survey at the time of the transfer of its work to the State roads commission.

Since June 1, 1910, all the road work of the State has been in the hands of the State roads commission.

State Road Laws.—The State roads commission selects the State road system to be improved and proceeds with its improvement in the discretion of the commission and out of the proceeds of the State road loans provided for this purpose.

Maintenance.—The maintenance of the State roads is performed by the State roads commission direct, and toward this work, a portion of the revenues of the automobile license law is available. The balance that may be necessary must be provided by the commission from its other funds. While the maintenance systems of the different counties are not uniform, the State roads commission had adopted a system involving the employment of permanent patrolmen.

State Aid Road Law.—Under the State aid law, the counties apply annually for the State aid desired, and when application is approved by the State roads commission, plans and specifications for the work are prepared by the State, the contract for the work being let by the counties subject to the approval of the State, and the performance of the contract supervised by the State. On the completion of the work, its cost is shared equally by the State and the counties. The allotment of the State funds for the purpose is made to the counties in proportion to their various public road mileages.

Maintenance.—After the construction of a State aid road, its maintenance devolves on the county authorities, subject to the approval of the State. A portion of the revenues from the automobile license law is available to the counties toward maintenance.

Automobile Law.—Above references to the revenues from the automobile license law proceed from the fact that the State law concerning the licensing of automobiles provides that the net revenues from the license shall be turned over to the State treasurer "who shall create a special fund thereof, and on the first day of April in each year one-fifth thereof to be paid to the mayor and city council of Baltimore for use on its roads and streets, and the balance to be used for the oiling, maintenance and repair of the modern roads now being built by the State and counties and for no other purpose. Disbursements of the remaining four-fifths from this fund shall be made by the treasurer to the counties on drafts and expenditures which have actually been made in repairs on State aid roads certified to by the State roads commission, and to the State roads commission for expenditures which have actually been made in repairs on State roads constructed by that body, on drafts from such body itself. The State roads commission shall not receive in any year out of the whole fund available for distribution, a greater proportion than the proportion which the total mileage of State roads completed to April 1 of any year shall bear to the total mileage of both State aid roads and State roads completed to that date. And no county shall receive in any year from such fund a greater proportion than its total mileage of State-aid roads bears to the total mileage of State aid roads completed before April 1 in any year. The remainder of said funds shall be distributed among the counties in the proportion aforesaid."

Local Road Administration.—Jurisdiction over roads vests in the board of county commissioners, who are made a corporation and given full power to appoint road supervisors and other county officers, not otherwise provided for, to construct county roads and bridges and, if deemed to the best interests of the public, may commit the construction and repair of roads and bridges to the charge of competent civil engineers.

All road taxes are paid in cash.

The county commissioners levy all taxes for road purposes, no specific levy being provided by statute. In some counties the said boards levy a special road tax, while in others the money for road building purposes is appropriated from the general fund.

There is no general county bonding law. It is necessary in each case for the legislature to pass an act to authorize a bond issue, it must then be published for two months prior to the next election of members for the House of Delegates in the newspapers published in the county and shall also be approved by a majority of all the members elected to each house of the general assembly, at its next session after such said election.

Special Local Road Laws.—For a number of the counties special laws have been passed compelling the employment of roads engineers, the first one being in the case of Baltimore county by the legislature of 1900.

Legislation in 1912.—The 1912 session of the legislature enacted legislation providing for the issuance of certificates of indebtedness for $3,170,000 to complete the system of State roads, the certificates to be payable in fifteen years, with interest to be fixed by the governor, comptroller, and treasurer. The act provides that none of this amount shall be expended on force account or under joint supervision of county and State authorities. The latter requirement is waived where work has heretofore been so proceeded with.

The act provides that $2,000,000 shall be expended in the counties, $300,000 in Baltimore county, and $625,000in Baltimore city.

To meet the interest and create a sinking fund an additional state tax of 3 cents on each $100 assessable property is provided for. The State roads commission is directed to reconstruct about ten miles of road between Perryville and Elkton, for which $40,000 is provided.

The sum of $300,000 is allotted jointly to the counties of Calvert, Charles and St. Mary's in addition to their regular allotment.

It is further provided that $200,000 shall be made available for completing the State road between Baltimore and the District of Columbia.

Maintenance of State Highways.—An act approved April 8, 1912, provides that all State roads under the control of State roads commission shall be maintained in good condition by the commission, and for that purpose an annual State tax of 1 cent on each $100 was provided. The commission is given full authority to adopt such methods as it may deem advisable, to employ engineers and assistants, purchase equipment, appliances and materials, etc. An accurate and detailed cost record is required to be kept showing cost and quantity of the various materials, the durability, effects of traffic, etc., upon the different types of road constructed and to embody in its annual report to the governor a synopsis of such investigation and expenditures.

MASSACHUSETTS

Summary of Highway Laws.—The highways are divided into State highways, county highways, and city or town ways. The county, city or town ways are cared for by the municipal authorities, viz., superintendents of streets, road commissioners and highway surveyors. The provisions in cities are various, the jurisdiction being sometimes placed in boards of commissioners and sometimes in boards of aldermen. The appropriations for either improvements or repairs are made by the city government or at a town meeting.

County commissioners, upon petition and after hearing, have authority to lay out new ways or to widen and improve existing ways and order specific repairs to be made thereon. They may direct a city or town to made specific repairs, or the county commissioners may make such repairs themselves and determine what part of the cost thereof shall be paid by the city or town benefited. The county assesses a tax on the municipalities and this tax, as well as the State tax, is collected by the towns and cities in connection with the municipal tax.

Cities and towns also have authority to lay out and construct new ways and to widen and improve existing ways and can direct their improvement and appropriate money therefor.

Massachusetts Highway Commission.—The Massachusetts highway commission, established in 1893, consists of three members appointed by the governor for three years, one term expiring each year. Salaries: Chairman $5000; commissioners, $4000 each.

The duties of the commission relate to roads, automobiles and the supervision of telephone and telegraph companies.

Automobiles.—It registers motor vehicles, licenses the operators and may make regulations not inconsistent with the law, concerning the operation of motor vehicles. It investigates automobile accidents, and may suspend or revoke the licenses of operators and the registration of motor vehicles for proper causes, and must do so when the person holding a license or registration certificate is convicted in court of certain offenses.

Highways.—Its duties in relation to highways are first, the collection of statistics as to road materials, etc., making maps, naming highways and giving advice on road matters to authorities who have charge of road building or maintenance; and, second, laying out and construction of State highways and the improvement of certain town roads.

State Highways.—Since 1894 appropriations have been made by the legislature for the construction of State highways, the money being raised by a bond issue, usually authorized in five-year periods.

The commission may lay out as a State highway a new or existing way in any city or town upon petition of the city government, board of selectmen or the county commissioners. When a road is so laid out it is maintained by the commission, under the law, and the commission has entire jurisdiction over it, even to the extent of determining the locations of water and gas mains, poles and other structures. No work can be done on any State highway, nor can any tree located within the limits of such highway be cut without a permit from the commission.

A road becomes a State highway when copies of the petition. layout plan and adjudication are filed in the offices of the clerk of the county commissioners and the clerk of the city or town.

When a State highway is laid out and constructed by the commission the county in which it is located pays 25 per cent of the cost of construction.

Small Town Roads.—The commission also has 15 per cent of the amount appropriated for State highway construction, which it may spend as follows: 5 per cent in towns of less than $1,000,000 valuation upon petition, the town making no contribution; 5 per cent in towns of less than $1,000,000 valuation upon petition, the town contributing an equal amount, and 5 per cent in towns of more than $1,000,000 valuation upon petition, the town contributing an equal amount.

These roads remain town ways and the towns are responsible for their maintenance and for any accident which happens thereon. The commission has authority, however, to repair such roads and to charge back to the towns in which they are located the cost of repairs, not to exceed $50 a mile a year.

In some cases the towns have borrowed the money and have constructed highways which the commission has taken over after they were constructed, the construction of which involved no expenditure on the part of the commonwealth.

The amount available at present under existing laws is $500,000 a year for State highway construction and work under the small town act. This is raised by the issue of bonds, and the counties in which the roads are located repay to the commonwealth 25 per cent of the amount expended for this purpose.

Under the automobile law, all the net automobile fees and fines, after paying the expenses of administration (which include number plates, expense of investigating and reporting on accidents, many hearings a week and sometimes prosecutions) are available for the repair and maintenance of State highways and for the construction and improvement of town roads. Of this net amount, 20 per cent may be spent by the commission, upon petition of the selectmen, in the repair, improvement or construction of through roads connecting one city or town with another; the roads remaining town ways. The other 80 per cent of the net amount is available for the repair, maintenance, oiling, etc., of State highways.

The counties repay to the commonwealth 25 per cent of the money expended for maintenance that is received from the legislative appropriation, but no part of the money that is expended from the motor vehicle fees fund.

The town in which a State highway is located repays to the commonwealth a part of the actual cost of maintenance, the same not to exceed the sum of $50 a mile a year and in no event more than the actual amount spent. This is levied together with the State tax.

Advice to Road Authorities.—The commission, through its engineers, upon petition of the county or municipal authorities, furnishes engineering advice in relation to road construction and maintenance. It is now a very common occurrence for city or town authorities to request the advice of the commission and its engineers, and this is always given.

In many cases the request comes from the superintendent of streets or other officer in charge of the road work in the city or town.

In many instances the commission acts as engineer for the city or town in making the preliminary surveys, plans and estimates, preparing the contract and specifications and advertising for bids for the local authorities; also in supervising the work and certifying the amount of money due the contractor from time to time.

On many occasions the commission has also drawn plans for bridges, etc., for the county authorities and acted as engineer under the contracts.

Actual Work.—When a State highway is to be laid out or work is to be done under the small town act the commission in the first instance offers the contract to the city or town in which the highway is to be located, the contract being based on prices satisfactory to the commission. If acceptable to the local authorities, the contract is let to them, and the work is performed under the direction of the commission and its engineers.

Contracts for State highway construction are almost invariably based on a given unit price for each item of work, while "small town" contracts are made on the "lump sum" basis, the contracts providing for the improvement of a certain length of road in accordance with certain specifications. In every instance the work is required to be done to the satisfaction of the commission's engineers.

If the local authorities do not elect to take the contract, bids are advertised and are publicly opened and read; and while the commission reserves the right to reject any or all bids, it usually lets the contract to the lowest bidder.

Organization.—There is a central office in Boston, with three commissioners, a secretary and various assistants in the highway department; an automobile department, having charge, under a chief clerk, of the registration of motor vehicles and the licensing of the operators thereof, and a department in charge of examinations and investigations. A chief engineer has entire charge of all engineering work, and under him are assistant engineers at the central office, who have charge of the office engineering force, the making of plans and estimates, the drawing of contracts, etc., and five division engineers in charge of the roads in their respective divisions. They also have assistants and resident engineers who are assigned to particular pieces of work, and each division engineer has his own office, one being located in Boston, one in Middleboro, one in Pittsfield, one in Greenfield and one in Worcester.

MICHIGAN

The Michigan State highway department is in charge of the State highway commissioner, appointed by the governor for four years. In 1913 and every four years thereafter, a State highway commissioner shall be nominated and elected by the people of the State of Michigan at the same time and in the same manner as the justices of the supreme court are nominated and elected. He shall be a citizen of the State and shall receive an annual salary of $2500 and may appoint a deputy, who shall be a competent engineer and employ such other employees as may be necessary to carry on the work of the department. The governor shall fill vacancies in the office of the commissioner, but such appointee shall hold office only until the next general election.

Duties of State Highway Officials.—The State highway department shall give instruction in building and maintaining public roads and bridges; shall collect reports from township and highway commissioners, superintendents or commissioners of streets; and shall distribute any state reward for improving public roads or any funds given to the State for such purposes by the United States government or by individuals. The commissioner shall make a biennial report to the governor on or before February 1 every odd year and shall supply every township highway commissioner in the State with a copy. The State highway commissioner shall furnish outline plans and specifications for the improvement of public roads and when requested he shall go or send some one to give expert advice regarding the construction of public bridges where the proposed improvement is of sufficient importance to warrant such action. He shall gather all possible information about road materials and give this information to any road or street official upon request, free of charge. He shall keep a complete record of the doings of the State highway department and shall make a map of every township in the State showing the roads and their condition and the location, kind and quality of road materials, etc. He shall enter applications received from township boards or county commissioners for the allotment of State rewards and shall allot funds in the State treasury in compliance with the law. He is given authority to refuse any further road reward to any township or county that has been rewarded by the State for improving roads and has failed to keep such roads in proper repair. He shall, however, inform the township or county officials of what repairs are necessary and if such repairs are made satisfactory to him he shall reinstate such township or county to the eligible reward list. His decision shall be final as to whether a road merits State reward and he shall have the right to withhold any portion of the reward until the road has been thoroughly tested.

Duties of Local Officials.—The highway commissioners of the several townships in each county, under the direction of the township board, have the maintenance of all earth roads and have authority to construct and maintain State reward roads under the direction of the State highway commissioner. County road commissioners have the construction, care and maintenance of all roads, which they may take over from townships and have authority to construct and maintain State reward roads under the direction of the State highway commissioner, and to construct and maintain all county roads, designated as such by the supervisors of the counties working under the county system, and also have the authority, under the direction of the supervisors, to expend the county road tax for the highway purposes.

At the request of the State highway commissioner, every township highway commissioner and every board of county commissioners and every village or city superintendent or commissioner of streets shall make a sworn report to the State highway commissioner on or before December 1 in each year, answering any questions that the State highway commissioner may deem proper to ask concerning road materials, machinery, etc. Upon the refusal or neglect of such local road authorities to make such report at the time stated, or within thirty days thereafter, or if they shall make a report which shall be wholly or partly false, they shall be deemed guilty of a misdemeanor and upon conviction thereof fined not less than $10 nor more than $100 and costs, and be confined in jail not less than ten nor more than thirty days for each offense.

Each township highway commissioner is assisted in his duties by one or more overseers of highways. Before beginning any improvement work, the township commissioner or the board of county road commissioners shall cause a survey to be made by a competent engineer for the purpose of establishing both grade and location and to furnish information for the construction of the proposed highway under the direction of the township highway commissioner or the county road commissioners.

Taxes.—All highway taxes are paid in cash and the money is disbursed, in townships, by the township highway commissioner and township board; in counties, by the board of county road commissioners, acting under the direction of the board of supervisors; the State reward road fund, by the State highway commissioner, as designated and directed by the statutes.

State Highway Funds.—Whenever any township board or county commissioners have made arrangement to improve a mile or more of public road by constructing a sand-clay, gravel, stone-gravel, gravel-stone, macadam or concrete road and shall ask for an allotment of State reward, and shall file with the State highway department a profile of the road to be improved, made out by a competent civil engineer, and shall make application for plans and general specifications, the State highway commissioner shall enter such application, furnish plans and specifications, and allot funds from the State treasury as a State reward, if, after completion, he shall find the road up to the required standard.

Each surveyed township is entitled to receive State reward on not less than one nor more than three miles in any one fiscal year. The following described roads when constructed shall merit State rewards attached to each description:

(a) Every mile of well graded road on which the steepest incline shall not exceed 6 per cent, and the width of which shall not be less than 20 feet between and exclusive of side ditches, and which shall be properly drained, and have a wagon way or travel track not less than 9 feet wide, made of a mixture of sand and clay or other material according to specifications furnished by the State highway commissioner, shall merit, if approved by the State highway commissioner, a reward from the State of $250 and pro rata for extra miles and fractions thereof in excess of the first mile.

(b) Every mile well graded with the steepest grade not exceeding 6 per cent, and not less than 20 feet between ditches, properly drained, with travel track not less than 9 feet wide, and which shall consist of not less than 8 inches of compacted gravel applied in not less than two courses, each layer rolled separately, shall merit, if approved by the State highway commissioner, a reward of $500 a mile and pro rata for extra miles and fractions thereof in excess of the first mile.

(c) Every mile with grade not exceeding 6 per cent, and not less than 20 feet between ditches, properly drained, with travel track not less than 9 feet wide made in two courses, bottom course of crushed stone, slag or other material, and not less than 4 inches thick after thorough rolling, and a top course consisting of a layer of gravel not less than 3 inches thick after graveling, shall merit, if approved by the State highway commissioner, $750 per mile and pro rata for extra miles and fractions in excess of the first mile.

(d) Every mile with grade not exceeding 6 per cent, and not less than 20 feet wide between ditches, properly drained, travel track 9 feet wide made in two courses, the bottom course to be of gravel, slag or other material as approved by the State highway commissioner, and not less than 4 inches thick after rolling, and a top course of crushed stone not less than 3 inches thick after rolling and properly bonded, shall merit, if approved by the State highway commissioner, $750 a mile and pro rata for extra miles and fractions in excess of first mile.

(e) Every mile with not exceeding a 6 per cent grade, 20 feet wide between ditches, properly drained, travel track not less than 9 feet wide, of well compacted macadam not less than 6 inches thick, laid in not less than two courses of crushed stone, each to be properly bonded with stone screenings, asphaltic, bituminous or other cement approved by the State highway commissioner and thoroughly rolled: Provided, that both shoulders and metal track shall be properly crowned so as to shed water quickly to the side ditches, shall merit, if approved by the State highway commissioner, $1000 per mile and pro rata for extra miles and fractions in excess of the first mile.

(f) Every mile of well graded road on which the steepest incline shall not exceed 6 per cent, and the width of which shall be not less than 20 feet between side ditches, and which shall be properly drained, and have a wagon way or travel track not less than 9 feet wide in the clear between beveled edges and which shall consist of properly laid concrete not less than 6 inches in depth, composed of Portland cement and gravel, of sand and crushed stone, with or without a paving brick surface: Provided, however, that the cement shall be required to meet the standard tests then in force of the American Society for Testing Materials, and that the other ingredients, the manner of laying and the kind of inspection employed shall be made to comply with specifications made by, or approved by the State highway commissioner, shall merit, if approved by the State highway commissioner, a reward from the State of $1000 per mile and pro rata for extra miles and fractions thereof in excess of the first mile.

Two or more townships or two or more counties may act jointly in the improvement of boundary line roads under the provision of this act. If there are not sufficient funds in the treasury to meet the applications for State reward, said applications shall be filed and allotment made as soon as there are available funds. If a township or a county shall have raised money to build a mile or more of road such as merits State reward, then the road shall be approved by the State highway commissioner, and such townships or counties shall draw from the State reward fund each year until the township or county shall have received the equivalent of the reward, provided the road is kept in as good condition as when approved by the commissioner.

There was appropriated, for the use of the State highway department, for the fiscal year ending June 30, 1912, $250,000; and for the fiscal year ending June 30, 1913, $250,000, of which $10,000 each year is set apart for the running expenses of the department, and the balance constitutes the State reward fund. Any portions of these funds unexpended at the close of any fiscal year shall be carried over and added to the fund for the succeeding year.

Convict Labor.—The legislature of 1909 made provision whereby county road officials could have the use of and direct the employment of county prisoners, confined for petty offenses, upon the highways in the county. The legislature of 1911, additionally, provided that upon proper applicaton by highway officials to the wardens of the various State penitentiaries, State prisoners might be put to work upon the highways in the same manner that county prisoners had heretofore been used, and that such convicts might also be used in surface quarries and stone yards in preparing material to be used on the public highways and hauling the same to the place of distribution, and the State should be remunerated for the services of such convicts by the highway officials.

MINNESOTA

State Highway Commission.—The State highway commission consists of three members appointed by the governor to hold office for three years, one new commissioner appointed each year. The commission holds regular meetings not less than once in each two months. The commission appoints a secretary who shall be a civil engineer and practical road builder and shall be known as the State engineer, to hold office subject to the pleasure of the commission. The commission may employ other assistants and fix their compensation.

The State engineer and his assistants shall give advice and supervision in road and bridge construction throughout the State under the rules of the commission and perform such other engineering services as the governor may require for any of the State departments.

Whenever practicable the commission shall investigate the location of road materials in the State, ascertain most approved methods of construction, investigate road laws of other States and hold public meetings throughout the State. The commission shall make report to the governor on or before March 1 of each year.

State Aid to Road Improvement.—For the purpose of State aid in the construction and improvement of public highways the law requires that there shall be levied annually a tax of one-fourth mill on each dollar of valuation, and the money so raised, together with all moneys accruing from investments in the internal improvement land fund, shall constitute a general State road and bridge fund to be expended only on State roads.

On or before the first Tuesday in March of each year the highway commission shall estimate the probable sum that will accrue to the State road and the bridge fund and apportion the same among the different counties and notify the State auditor and the county commissioners of such allotments. No county shall receive in one year more than 3 per cent nor less than one-half of 1 per cent of said fund, and in determining the percentage accruing to any one county the commission shall take into consideration the area of such county, the amount of money expended by it in road construction, the difficulty and expense of such construction, and the extraordinary expense connected with the development of new territory.

Designation of State Roads.—Any county board may designate any established road in the county as State road and improve it in accordance with the regulations of the State highway commission. State engineer shall make all necessary surveys, establish grades, prepare plans and specifications, and have supervision of all work on State roads.

When a county board makes application to the State highway commission for the designation of an established road running into an adjacent county as a State road the commission if it deems it necessary shall so designate the road and determine the part of the cost to be paid by each county.

The word "road" or "highway" is held to include bridges, provided that in no case shall more than one-half of the cost of constructing any road or bridge be paid by the State.

The highway commission may appoint assistant engineers throughout the State for the purpose of superintending work on State roads and they shall act under the instructions of the State engineer. Final payment shall not be made on contracts for road work until the assistant engineer has certified that the work has been properly done according to contract.

Procedure to Secure State Aid.—Whenever a county board shall determine to improve a State road, for which they desire State aid, they shall, if the cost does not exceed $500, cause surveys to be made, when necessary, by a State assistant engineer and shall then let contract to the lowest responsible bidder or cause same to be done by day labor. If the cost is over $500 the county board shall cause survey, plans and specifications to be made by the assistant engineer and submit the same to the highway commission for approval, and when such approval has been obtained the county board shall proceed to do the work by contract or day labor under the supervision of the assistant engineer who shall act under the rules and regulations of the highway commission and instructions of the State engineer. After completion of the work the county auditor shall certify the same to the highway commission and submit detailed report of the assistant engineer, and if the highway commission shall approve, the secretary of the commission shall certify the same to the State auditor who shall issue a warrant for one-half of the amount payable to the treasurer of such county but in no case shall the warrant exceed the amount alloted to such county.

Annual Inspection by State Engineer.—State engineer shall make an annual inspection of all bridges exceeding 30 feet in length and report the condition of same to the highway commission and the county board with recommendations.

Appropriations.—An appropriation was made for the fiscal year ending July 31, 1912, and annually thereafter of $150,000 for State aid and the expenses of the commission, and all unexpended funds in any year shall be carried over to the subsequent year.

All accounts and expenditures shall be certified by the chairman of the commission and paid by the State treasurer upon warrants drawn by the State auditor.

General Laws of the State.—Roads classified as town and county roads, as laid out by either authority.

County can levy two mills on the dollar of their valuation for road purposes. All county funds applied on State roads to be expended under rules and regulations of highway commission. State engineer's department required to give advice and expert assistance to counties and towns when called on and to superintend such work. Minnesota still has the ancient system of working out road taxes.

MISSISSIPPI

Constitutional.—Each county must be divided into five districts, each district to elect a supervisor, the five constituting a board of supervisors, which has full jurisdiction over roads, bridges and ferries, to be exercised in accordance with such regulations as the legislature may prescribe.

Convict Labor.—The legislature may authorize the employment under State supervision, of convicts on public roads, or other public works, provided that such employment shall not interfere with the preparation or cultivation or good management of the State farm, nor put the State to any expense.

Statutory.—The board of supervisors shall have, in their respective counties, full jurisdiction over roads, ferries and bridges, Each supervisor is to have general supervision over the public highways in his supervisor's district.

The board of supervisors may appoint a road overseer for each district. No person shall be required to serve as overseer more than one year in every three.

The board of supervisors in each county, may in their discretion, appoint a competent person as road and bridge commissioner, with a compensation not to exceed $5 per day, for days actually served, and may purchase teams, implements and materials, and have work done under said commissioner.

The board of supervisors may determine to work a public road or some part thereof by contract, letting the contracts as other contracts are let by the said board, each road or division under separate contract. A contract shall not be let for a shorter time than two years; but a contract may be let to do specific work, as cutting down a hill, causewaying a marsh or swamp or the like without requiring the contractor to keep it in repair.

The board of supervisors may construct one or more highways in each supervisor's district and for that purpose are authorized to issue bonds and levy taxes to pay such bonds and maintain the roads. Upon petition to the board from 20 per cent of the qualified electors of such supervisors district, the board shall publish notice of its proposal to issue the bonds of such district and if within three weeks 20 per cent of the qualified electors shall petition against the issuance of bonds they shall not be issued unless authorized by a majority at an election held for that purpose. Otherwise they shall be issued by the board of supervisors. The bonds shall be limited to an amount not to exceed 10 per cent of the assessed valuation of property in the district, and shall mature in not less than twenty years from date of issuance and bear interest not to exceed 6 per cent per annum. They shall be exempt from all taxes and shall be payable in annual installments after ten years. If it is determined to issue the bonds the board of supervisors is required to appoint three commissioners in such district to hold office for four years whose duty it shall be to have the management and supervision of the construction and maintenance of the roads built with the proceeds of the bond issue. The board of supervisors is required to levy an annual tax on the recommendation of such commissioners of not exceeding one mill on the dollar which shall be used to supplement the general fund of the county in maintaining said roads and for paying the bonds and interest.

Taxation.—All male persons over eighteen and under fifty years of age, unless exempted by law, shall be required annually to perform not to exceed ten days work on public roads.

The board of supervisors, if the labor and commutation for labor be insufficient for working the roads by contract, may levy a tax upon all taxable property in the county not to exceed 1 mill on the dollar in any one year. Such taxes shall be kept as a road fund and paid out only on the order of the supervisors. Such taxes, collected within a municipality, which works its own streets, shall be equally divided between the road fund and the municipal street fund. A tax may be imposed on property contiguous to a shell, gravel or macadam road in addition to the other road tax for constructing or maintaining the road when the property would be greatly enhanced thereby.

Legislation was enacted in March, 1912, requiring each member of the board of supervisors in counties where there is no road commissioner employed to make a complete report to the board of supervisors on the first Monday of January, April, July and October of the needs and conditions of the highways in his district, such recommendations as he may think needful, and at least twice in each year, each supervisor shall inspect the roads in his district. Where no road commissioner is employed each supervisor shall receive $3 per diem for said services, not exceeding in the aggregate $150 per annum.

Benefit Assessments.—The owners of one-half or more of land bordering on any section of road may petition the county commissioners for a survey and estimate of the improvements of such road, and afterwards upon written request of the owners of three-fifths of such land as will be benefited by such improvements, that all lands so benefited be assessed in proportion to the benefits conferred to the extent of one-third of the cost of constructing such road, the board may levy a special tax on such lands sufficient to pay one-third of such cost, and such lands shall be known as the "benefit district" of such section of road. No benefit assessment shall be made on any land more than 3½ miles from the road.

Convict Labor.—The leasing of convicts is abolished and the board of supervisors is authorized to work them on county farms, or on public roads or other public works or to keep them in jail. This applies to municipalities also. Sexes and races are to be separated and work separately. No convict shall be let to contractors.

The superintendent of the penitentiary is authorized to improve and maintain not to exceed two roads from each convict farm in the state for a distance of 5 miles, out from said farms, with the convict laborers domiciled on said farms. The superintendent shall be amenable to the board of supervisors in the performance of this duty.

Legislation was enacted in March, 1912, authorizing the boards of supervisors of Rankin, Hines, Holmes and Sunflower counties to work all the able-bodies male convicts on the convict farm between the ages of eighteen and fifty years for a period of fifteen days on the public roads in the counties, the work first to be done on the roads leading from said farms to the county seats. The supervisors are required to furnish all necessary road machinery and implememts as well as tents, cages, etc.

Municipalities May Maintain Roads.—The mayor and board of aldermen or municipal authorities of any city, town or village may, if they deem it to the interest of such city, town or village, make contract with the supervisors of the county in which the same is located for working and keeping in repair the public roads leading into such city, town or village, so far therefrom as the authorities see proper. When such contract is let and approved by the supervisors it shall be executed under supervision of the mayor and aldermen.

Revenues.—The board may raise funds by bond issues not to exceed 5 per cent of the assessed valuation in the respective counties exclusive of outstanding bonds; by commutation tax of $3 on all persons subject to road duty; by an ad valorem tax on the assessed valuation of real and personal property of the county in the district; by an acreage tax or by both or any or all of said methods. This act does not apply until the county shall elect to come under the provisions of the act.

MISSOURI

State Highway Officials.—An act approved March 19, 1907, provides for a State highway engineer who shall be a competent civil engineer with a knowledge of road building. He is appointed by the State board of agriculture for four years and receives a salary of $2400 per annum and actual traveling expenses. Deputy highway engineers may be appointed when needed and their salaries fixed by the State board of agriculture. The State highway engineer and his deputies are subject to the instructions of the State board of agriculture.

Duties of State Highway Officials.—The State highway engineer is authorized to investigate road conditions and materials throughout the State, devise plans and methods of building roads and bridges and to give advice, specifications, and estimates to local road officials. The information secured by him and his assistants is to be compiled and published by the State board of agriculture. Improvements to be paid for in part from the "general State road fund" shall be submitted to the State highway engineer for approval when the cost of such improvement is not less than $1000 per mile of road or not less than $500 per bridge in the aggregate.

State Highway Funds and their Distribution.—There is established in connection with the State treasury a fund known as the "general State road fund" used for no other purpose than the permanent improvement of the highways within the State, which improvement is specified to be the surfacing of any road with gravel or rock or with a well constructed mixture of sand, clay, gravel, and rock, and any heavy grading of the road, and the construction of concrete or masonry culverts. Plans for such improvement are to be approved by the county court and where the cost is not less than $1000 per mile of road or not less than $500 per bridge to be submitted to the State highway engineer for his approval.

This road fund shall be apportioned to the several counties and the city of St. Louis when such counties and city provide the funds necessary for meeting at least one-half of the cost for such construction or improvements. The apportionment shall be according to the assessed valuation of property, but no county, district, or city shall be entitled to receive in any one year more than 3 per cent of the total amount belonging to said fund for said year. The requisitions of the several counties and districts and city of St. Louis shall be made on the State auditor on or before July 1, each year, and the part of the fund not applied for shall after two years revert to the State road fund and be subject to future apportionment. No part of this fund shall be used for the purchase of rights of way.

An act approved March 8, 1907, called the "stamp act," provides that a complete record be made of every sale of stock or bonds of any corporation, on margins or otherwise, and that the seller be required to place a stamp provided by the State auditor valued at 25 cents on each transaction. All moneys derived from their sale is set apart for road purposes and distributed among the counties in the same proportion as the school funds. This act has been fought in the courts up to the United States supreme court and recently adjudged to be constitutional. The estimated income from this source is $100,000 annually.

A law provides that a tax of not less than $100 nor more than $200 be levied on dram shops for state purposes, and not less than $250 nor more than $4000 for county purposes, the amount to be fixed by the county court levying the tax. The county court may use two-thirds of the county tax for road purposes and expend the same in the various districts in proportion to road mileage or it may expend all the money in one or more districts. In counties with a population of more than 150,000 and less than 400,000, inhabitants as much of this fund as may be necessary shall be used for the maintenance of macadam roads.

An appropriation of $12,000 was made in 1907 to pay the salary and expenses of the State highway engineer and his assistant for the biennial period and again in 1909 and 1911.

An appropriation of $75,000 in 1909 and $101,000 in 1911 was made to be applied to the credit of the general State roads fund and apportioned among the several counties and districts having unpaid requisitions correctly made under the act for State aid governing the general State road fund.

Automobile Licenses.—The legislature of 1911 enacted a law which provides for an annual license of automobiles and automobile drivers, that for the cars being graduated in proportion to the horse power, and placed the enforcement of the act and collection of licenses under the secretary of state. The revenue from this act will be about $100,000 annually and shall be paid into the general State road fund.

County and Local Road Administration.—County government is under two separate systems of organization termed the regular and the township organization. The two forms are similar in so far as concerns the election of a county board of three members termed the county court, and the members thereof the county judges. Two members, called the associate judges, are elected every two years and a presiding judge every four years. This court annually appoints a county highway engineer, as the county superintendent of roads, and fixes a salary between $300 and $2000 per year. The county courts under both systems control the opening of new roads, closing old ones and changing the rights of way.

In the regular counties, of which there are 92, the county courts have full charge and control of road affairs. They divide the county into road districts and appoint the overseers of the districts; fix the amount of road tax and make the road levies: proportion the amount due each district under the law; draw the warrants for payment of all road funds and build all bridges and culverts costing more than $50 per structure.

In the township counties, of which there are 22, the county courts build all bridges and culverts costing more than $100. The road affairs of each township in these counties are governed by a board of three members elected every two years. The board divides the township into road districts and appoints the overseers; fixes the amount in one form of levy and makes all the road levies for the township and pays out the road funds by warrants. The county engineer has no authority over the township boards in these counties, over the district overseers nor road expenditures, unless where the county court has jurisdiction in rights of way and bridges and culverts costing more than $100.

Local Road Funds.—There are three forms of local road levies. A poll tax which the legislature of 1911 made payable in cash only. All able-bodied male inhabitants between the ages of twenty-one and fifty years living outside of incorporated limits a cash tax of $2, and all other male inhabitants outside of incorporated limits 50 cents.

The amount of taxes for all county purposes is limited by the State constitution between 40 and 50 cents on the $100 of assessed valuation, depending upon the valuation of the county. These assessed valuations are fixed by the county authorities and range all the way from one-fourth to one-half of the full value. Out of this constitutional tax rate of 40 to 50 cents the county courts may use not to exceed 20 cents on the $100 assessed valuation for road purposes provided that the amount levied for road purposes shall be levied only on property outside of incorporated limits. This levy constitutes the road district funds of the several districts. It is levied by the county courts in all counties and is collected by the county officials in the regular counties and the township officials in the township counties. One-fifth of it must be returned by the townships in the township counties which makes the county bridge fund in these counties.

In addition to this the constitutional amendment of 1908 provides for an additional road levy of 25 cents on the $100 assessed valuation, to be used for roads and bridges and for no other purpose whatever. It is applied upon all taxable property, both within or without incorporated limits, and is a county road and bridge fund in the regular counties and a township road fund in the township counties. It is levied by the county courts in the regular counties and is left to the option of the court to apply any or all of it; and in a similar manner by the township boards in the township organized counties.

Special Districts.—Besides the two forms of county organization Missouri laws provide for two forms of special road districts both of which have been adjudged unconstitutional in township organized counties. There are now 120 of these special districts in the 92 regular counties. One form of these districts shall not, exceed 64 square miles in area, must include an incorporated city, town or village and may issue road bonds not to exceed 5 per cent of the assessed valuation of the district. The other special district is a strip of territory along a road organized for purposes of improving and maintaining the road and an acreage tax of any amount can be voted upon the lands within the district. Each special district is governed by three commissioners and the county court and engineer have no jurisdiction except upon rights of way questions and bridges costing more than $100. The regular poll tax rates and the property road tax levies applied in the county by the county court must prevail within the special districts, but all road moneys, one-half the county saloon revenue and one-fourth the city saloon revenue paid within the district must be set aside and returned to the district for road purposes.

Road Bonds.—The counties of the State of Missouri, the special road districts or the township may issue road bonds by a two-thirds vote in an amount not to exceed 5 per cent of the assessed valuation and for a period of fifteen years.

MONTANA

Constitutional.—The rate of taxation on real and personal property for State purposes, except as hereinafter provided, shall never exceed 2½ mills on each dollar of valuation; and whenever the taxable property of the State shall amount to $600,000,000 the rate shall never exceed 2 mills on each dollar of valuation, unless the proposition to increase such rate, specifying the rate proposed and the time during which the rate shall be levied shall have been submitted to the people at the general election and shall have received a majority of all votes cast for and against it at such election.

The legislature shall not, in any manner, create any debt or liability which shall exceed, in the aggregate, the sum of $100,000, except in case of war, unless the law authorizing the same shall have received a majority of vote of the people at a general election of the State.

No county shall become indebted, in the aggregate, exceeding 5 per cent of the taxable valuation. No county shall incur any indebtedness or liability for any single purpose exceeding $10,000, without the approval of a majority of the electors thereof voting at an election to be provided by law.

A city, town, township or school district cannot become indebted in any amount exceeding 3 per cent of the value of the taxable property therein, except that the legislature may authorize municipal corporations to submit the question to the taxpayers affected, to construct a sewerage system.

Convict Labor.—It is unlawful for convicts confined in penitentiaries or reformatory institutes to be let to contract to any person or persons or to corporations.

Statutory.—The board of county commissioners of the several counties have general supervision over the highways in their respective counties. The said board of county commissioners must divide their respective counties into suitable road districts and appoint a road supervisor for each district, for one year. Each road supervisor shall have charge of the highways in his district and keep the same in good repair.

In their discretion the boards of county commissioners may let out by contract the construction, maintenance and improvement of the highways, including bridges, when the cost exceeds $200.

The board of county commissioners may, by order, direct the county surveyor, or any member of said board or both the county surveyor and any member of said board to inspect the condition of any highway or bridge in the county and the work done thereon before payment therefor. Such member of said board shall receive, for making said inspection, $5 per day. The county surveyor shall receive for said inspection and for all other work performed for the county $7 per day and actual traveling expenses.

The resident owners of real estate within two miles on either side and one mile beyond the terminus of any main highway in the county, which it is desired to have improved, shall present to the commissioners of their county or counties a petition signed by a majority of such resident land owners. The county commissioners shall then inspect said highway, and shall approve or disapprove the same, and, if they shall approve, shall adopt a resolution to that effect and the county surveyor shall prepare plans and specifications for the improvement of said road. The contract for the construction shall be let, by the county commissioners, to the lowest responsible bidder, after due notice and advertisement. Twenty-five per cent of the contract price of such work shall be retained until the entire work has been completed and accepted. The county surveyor shall have entire supervision of the work and shall report to the board of county commissioners, and if there is no county surveyor then the said board shall appoint a competent person to so supervise the work, In the payment for the cost of such improvement, the county shall pay 65 per cent and the residents living adjacent to such highway shall pay the remaining 35 per cent of the cost thereof, in proportion to the benefits accruing thereto.

Road Taxes.—There must be levied on the taxable property in the county, for road purposes, not less than 1 nor more than 3 mills on the dollar. Also a special road poll tax of $2 on every man, over twenty-one and under fifty years of age residing in the county, is levied, to be collected by the road supervisor in cash, or to be paid by the performance of one day's work upon public highways. This section does not apply to incorporated cities or towns which levy and collect this amount for road, street and alley purposes, but if they do not so levy and collect this amount it shall apply to them also. All money collected under the above levy shall belong to the general road fund of the county.

The fund arising from the forest reserves of any State shall be paid to the State by the secretary of the treasury of the United States, in pursuance of a clause in the agricultural appropriation bill of 1906, which provides that 10 per cent of all moneys thereafter received from each forest reserve shall be turned over to the State in which the same is collected to be distributed among the counties and expended, one-half for the improvement and maintenance of roads and the other one-half for school purposes.

Bond Issues.—The board of county commissioners is authorized to issue coupon bonds for the construction of bridges and highways.

Width of Highways.—The width of all highways, except bridges, alleys and lanes, must be 60 feet, unless a greater or less width is ordered by the board on petitions of the persons interested. The width of all private highways and by-roads, except bridges, must be at least 20 feet.

All public bridges are maintained by the county at large, under the management of the county commissioners. Said board may levy a special tax, not to exceed 1 mill on the dollar of taxable property in the county, for constructing, maintaining, and repairing free public bridges.

NEBRASKA

Unit of Administration.—The county commissioners have general supervision over the public highways of the counties where the township organization does not exist and shall divide the county into as many road districts as may be necessary, provided that in no case shall any road district be so constituted as to be within the limits of two distinct voting precincts, or townships in counties under township organization. A road overseer is elected at each general election for each road district.

The county board of each county may appoint a county highway commissioner. He shall be a practical and experienced road builder and the county board may appoint the county surveyor or any other person deemed qualified for the office, provided that in counties having 50,000 population or over the county surveyor shall perform all the duties and possess all the powers of the said office of county highway commissioner. Said county highway commissioner and the county board shall have exclusive control of all public roads of the county. The district road overseer shall work under the direction of the county highway commissioner, where such commissioner is appointed. The county highway commissioner shall be the superintendent of construction of all roads and bridges and their maintenance, and shall make plans and specifications when requested by the county board for such improvements. He shall make, prior to January 1 of each year, a complete report to the county board of all work performed in improving and maintaining public roads in the county, showing the funds expended therefor. The road overseer of each district shall at least three weeks prior to the first day of the year report to the county highway commissioner. The county highway commissioner must have all main traveled earth roads in the county dragged regularly at such times as he may deem most beneficial and make contract therefor, with the approval of the county board, giving preference to the adjacent land owners or tenants, for a piece of road to be dragged, to cost not to exceed $1 per mile for each dragging, for a width not less than 16 feet. The compensation allowed to such county highway commissioner ranges from $5 per day and traveling expenses in counties of less than 8,000 population to $1500 per year and traveling expenses in counties having a population of 20,000 and less than 50,000, and where the county surveyor performs the duty of county highway commissioner in counties of more than 50,000 population no additional salary shall be received by him except his expenses when officially engaged. (The adoption of this law is optional with the county board.)

In counties having township organizations the county commissioners shall divide such counties into seven supervisor districts. Such districts shall be divided as near as possible with regular boundary lines and the same number of inhabitants, but no township shall be divided in the formation of any such district. In counties having cities of over 1000 inhabitants, where such cities have more than the average outlying districts, the county board shall add enough contiguous territory to such city to form two supervisor districts and shall segregate them with as nearly as possible equal population and the balance on the county outside of such city districts shall be divided as to create seven supervisor districts, including such city supervisor districts. A supervisor shall be elected by vote of the people for each such district.

In counties under the township organization control over the roads vests in the town boards, subject to general supervision of the county commissioners or board of supervisors. Each town is divided into road districts and an overseer appointed for each district.

All public streets of villages not incorporated are a part of the public roads and all persons having charge of the same in the respective districts of such villages shall work the same as provided by law.

Taxation.—In counties under township organization the township and county road taxes shall be paid in cash. All moneys paid into the town treasury from the road districts in discharge of property or labor road tax constitute a town road fund, at the disposal of the town board for the benefit of the road districts. One-half of all moneys so paid into the town treasury from the road districts shall constitute a district fund, which shall be expended by the town board in the road district from which it was collected, for the construction and repair of bridges and culverts, making fire guards along the line of roads, for the payment of the wages of the overseer, for the necessary tools and for work and repairs on the roads.

All road and labor taxes shall be paid in cash. One-half of all moneys collected as road tax shall constitute a county road fund, which shall be divided equally among the several commissioner districts for the general benefit of the roads therein; the other one-half of all labor and road taxes collected shall constitute a district road fund and shall be expended under the direction of the road overseer in the road district from which collected. The board may levy the same rate of road tax upon property within cities of the metropolitan class, cities of the first and second class and villages as is levied upon property of the several road districts, and one-half of all such tax, when collected, shall go to the county road fund; the other one-half to be paid to the city or village where collected.

On petition of a majority of the resident free-holders of any road district, precinct or township, to the county board asking that a levy of not less than 5 nor more than 25 mills be assessed on the taxable property therein, it shall be the duty of the board to make the levy as requested, the proceeds of which shall become a part of the district road fund of the said district, precinct or township and shall be used exclusively in improving the highways therein. Said levy may be continued each year, as often as requested, by the majority of free-holders.

The county board of any county in which any city of the metropolitan, or city of the first class, having over 25,000 inhabitants, is situated, may, whenever the road fund of said county will warrant, aid in grading, paving or otherwise improving any street avenue or boulevard leading into said city and within the corporate limits thereof, by providing for payment of not exceeding one-half of the cost thereof; and to so aid in the improvement of any such street, avenue, boulevard or road leading into and adjacent to such city, outside the corporate limits thereof and within two miles of the corporate limits including any portion thereof leading into or through any village or town.

Contracts.—The erection or repair of all bridges and approaches where the cost will exceed $100, must be let to contract by the county commissioners or the board of supervisors.

When it is necessary to build or repair any bridge or road in any town, the cost of which would be more than could be raised in one year by ordinary road taxes in such town, the town board may petition the county board for aid in defraying the cost of such work and the county board may do so, said appropriation to be expended under the supervision of the agents of the county and the contract shall be let by the town board, in accordance with the provisions of law for letting such contracts.

Bridges.—In counties under township organization the expenses of building, maintenance and repair of bridges on the public roads over streams shall be borne exclusively by the county within which such bridges are located and the county board of every such county shall make a permanent and adequate provision for the payment of the expeness thereof.

Bond Issues.—Any county, township, precinct, city or village in the State may issue bonds to construct or aid in the construction of a highway wagon bridge across any boundary river of the State, if three-fifths of the voters shall so determine at an election held for that purpose. Said bond shall not exceed 10 per cent of the assessed valuation in such county, township, precinct or village.

Split-log Drag.—Road overseers are authorized to maintain roads by the use of "King Road Drag" such work to be done by contract or otherwise; rural mail routes to be given preference in such work.

Special Bridge Fund.—The board of county commissioners or board of supervisors in counties under township organization may levy annually a tax not to exceed one mill upon the dollar as a special emergency bridge levy. Said fund shall be at the disposal of the county commissioners, or the board of supervisors for use in the construction or repair of bridges whenever an emergency warrants the same.

Inheritance Tax.—An inheritance tax is provided on all gift legacies and inheritances in certain cases and the proceeds expended under the county board for the purpose of permanent highway improvements throughout the different counties.

Fund from Forest Reserves.—The forest reserve fund, created by act of congress, 1906, provides that 10 per cent of all money thereafter received from each forest reserve be turned over to the State in which located, to be expended for schools and roads, is to be apportioned among the counties in proportion to the area of forest reserves contained therein respectively.

State Aid for Bridges.—The State board of irrigation is the State board of supervision for bridges, located and constructed under this act, and the State engineer, acting under the board, is empowered to carry out the orders thereof. The county board may make application to the State board of irrigation for State aid in the construction of any bridge across any stream, of the width of 175 feet or more, under the jurisdiction of the said board. Said application shall pledge said county to furnish one-half of the cost of the construction of said bridge. All work shall be by contract let by the said board and the State board of irrigation jointly to the lowest and best bidder. Plans and specifications are to be furnished by the State engineer and the construction shall be under joint supervision of the State board of irrigation and the said county board and must be accepted by them before final payment therefor. After completion of such bridges and the acceptance thereof by the State board of irrigation, the county having jurisdiction shall bear the cost of maintenance of same where it does not exceed $100 per year, and in case it exceeds $100 per year then such cost shall be borne equally by the State and county or counties. There shall be a State levy on each dollar of one-fifth of 1 mill per annum to constitute the "State aid bridge fund," which shall be used exclusively for the purpose.

Motor Vehicles.—A registration fee of $1 for each motorcycle and $2 for each motor vehicle, other than motorcycles, is required of the owner of each such vehicle within the State. Each manufacturer of or dealer in motor vehicles may register one vehicle of each class manufactured or dealt in by him. It is unlawful for any person under 16 years of age, or for any intoxicated person, to operate a motor vehicle.

The provisions of the act which relate to registration and fees, shall not apply to motor vehicles owned and operated for a period not exceeding thirty days at a time, by non-residents of the State, who have complied with the registration laws of their own State, territory or district. All registration fees provided for in this act shall be paid to the treasurer of the county in which the applicant resides and shall be credited to the county road fund for the construction and maintenance of permanent roads. Application for registration of motor vehicles must be made to the secretary of State.

NEVADA

Constitutional.—To enable the State to transact its business on a cash basis the State may contract public debts, but such debts can never in the aggregate, exclusive of interest, exceed the sum of $300,000, except for defraying extraordinary expenses.

Administration.—The roads of each county are under the control of the board of county commissioners. All public roads and the streets and alleys in incorporated cities and towns in the State, now used or lawfully entitled to be used as such, and all such roads as the board of county commissioners shall hereafter lawfully cause to be opened, are public highways.

The county commissioners in each county may appoint one road inspector for each district, to hold office at the will of the board. His duty shall be to superintend, inspect and approve, if properly done, all work upon the public roads of his district, including that to be done by supervisors, if any, and report thereon to the board of county commissioners. He must serve without compensation unless there be especial prescribed limit of compensation for said office in such road districts.

The commissioners of each county polling at the last general election 3000 votes or over, shall divide the county into road districts. The county commissioners shall appoint and fix the compensation of one road supervisor in each road district, to serve during the pleasure of the board. It shall be the duty of such supervisor to supervise all work upon the roads in his district, to attest the correctness of all bills for such work and to direct expenditures of all sums set apart in his district by the county commissioners. Each road supervisor shall execute bonds to the State to be approved by the county commissioners, in the penal sum of $100.

Road Taxes.—All moneys received from poll tax collected by the county commissioners shall be set aside for the different road districts in the counties, according to the amounts collected in each.

The county commissioners may levy a tax not exceeding one-fourth of 1 per cent , the proceeds of which must be paid into the road fund. Also when a majority of the property-holders of any road district shall petition the county road commissioners for a road tax for any such district, they may levy a tax not exceeding $3 on each $100 valuation provided that this tax may be worked out at a rate not exceeding $3 for each full day's work and implements of labor, and $4 per day for each team of two animals and $1 for each additional animal.

Contracts.—All work done shall, when the probable cost exceeds $500, be done by contract let to the lowest responsible bidder.

When the cost of construction and repair of any bridge will not exceed $500, the county commissioners shall let same to contract without advertising for bids, but in case such cost will exceed $500 the contract shall be let to the lowest responsible bidder after advertisement by the county commissioners.

Toll Roads.—Any persons desiring to construct and maintain a toll road or bridge within a county may do so after making proper application therefor to the proper county officials, and provided that after five years' time the county or counties shall have the right to purchase same at an appraised valuation. The rates of toll shall be subject to regulation by the board of county commissioners.

Width of Roads.—The width of all public highways must be regulated and established by the board of county commissioners, but shall not exceed 60 feet.

Guide Boards.—It is the duty of the board of county commissioners to cause to be erected at each crossing of all public roads a sign or guide board. It is the duty of the owner or owners of toll roads to erect proper sign and guide boards along their roads.

Convict Labor.—Twenty thousand dollars is appropriated for a general road fund. The State prison commissioners are authorized to detail for work on the public highways any male convict in the State prison who, on the recommendation of the warden and in the opinion of the said board may be properly so detailed, except prisoners under sentence of death, provided that such detail shall be voluntary upon the part of the convict and shall not be caused by any form of compulsion.

Convicts while working on the roads shall be under the general direction of the warden and guards appointed by him. They shall not be required to wear stripes, and for infraction of rules the maximum punishment of any convict shall be his summary return to the penitentiary and forfeiture of credits. In addition to the time off for good behavior, now allowed by law, convicts so detailed to work on the public roads shall be allowed ten days off for each month's faithful work and compliance with such rules and regualtions, and in addition thereto each such convict shall be allowed the sum of 25 cents for each day's labor, which shall accumulate and be paid on the termination of sentence or on his release by pardon or parole and which shall be in addition to the sum ordinarily given such convicts; Provided that on petition of any such convict said State prison commissioners, in their discretion, may pay out from any sum so to the credit of any convict any portion or all thereof in support of the dependent wife, child or parent, of any convict, in distress.

Said board, on the recommendation of the State engineer or the county surveyor of each county, shall determine upon what public roads convicts so detailed shall be employed and shall pass upon the plans and specifications of the State engineer or the county surveyors in respect thereto.

The State engineer shall have general supervision and direction of all road work so approved. No road work shall be undertaken without an agreement with the county commissioners with respect to the surveys, etc., and that such counties will, at their own expense construct all necessary bridges, and such counties may be required by said board to contribute in part toward the expenses of the maintenance of convicts on such road work.

NEW HAMPSHIRE

State Highway Department.—The governor and council are authorized to appoint, and fix the compensation of, a State engineer, and such other officers and employees as may be necessary. The governor and council shall make bi-ennial report to the general court, showing all expenditures, and containing information and recommendations.

The governor and council shall act upon all applications for State aid, and shall apportion the aid among the various counties, cities and towns, making such application.

All State aid road work shall be under plans and specifications provided by the governor and council, and where the amount of such improvement exceeds $1000 shall be let by contract to the lowest bidder. If, however, any town, city or unincorporated town shall desire to execute such work, having proper machinery and facilities therefor, the governor and council may permit them to do so. If no acceptable bid is received, the State highway engineer shall so certify to the governor and council, who may, with the approval of the proper local authorities, employ agents to perform such work upon terms satisfactory to the governor and council, and the highway authorities of such city or town.

State Highways.—All state highways shall be constructed and maintained under the direction of the governor and council, or someone appointed by them, at the expense of the State. The said governor and council shall cause surveys to be made of all such State highways, and deposited with the secretary of State.

The governor and council shall designate for improvement three continuous highways. The first shall extend from the Massachusetts State line at Seabrook to, and through Pinkham Notch, thence through Dixville Notch to Colebrook, and shall be known as the Eastside Road. The second shall extend from State line at Nashua over the road designated by the governor and council, continuing to the town boundary between the towns of Woodstock and Lincoln, and shall be known as the Merrimac Valley Road. The third shall extend from the State line at a point to be determined by the governor and council along the Connecticut and Ammonoosuc Valleys to the terminus of the Eastside Road at Colebrook, and shall be known as the Westside Road. The routes of such highways may be changed by the governor and council to such an extent as they may deem necessary to the best interests of the public.

The governor and council may, upon the application of any town or unincorporated town or place, furnish free of charge, an engineer in the employ of the State, for advice as to road improvement.

Road Revenues and State Aid.—Each town shall, out of the money raised for the repair of its highways, set apart the following amounts for the improvement of its highways, under the supervision of the State engineer.

Towns having a valuation of less than $2,000,000, $1 on each $1000 of such valuation.

Towns of $2,000,000 and less than $3,000,000 valuation, 75 cents on each $1000 of such valuation.

Towns of $3,000,000 and less than $5,000,000 valuation, 50 cents on each $1000 valuation.

Towns of $5,000,000 and less than $15,000,000 valuation, 33⅓ cents on each $1000 valuation.

Towns of $15,000,000 and upwards valuation, 25 cents on each $1000 valuation.

Counties within which are located unincorporated towns, $1 on each $1000 of the valuation of each unincorporated town in which there are highways.

If any city, town or unincorporated town desires State aid, for the permanent improvement of its highways, in addition to the improvements provided for by the foregoing amount, they shall raise and set apart an additional sum equal to 50 per cent of the amount required to be raised for permanent improvements, and such additional sum, so raised and appropriated, shall be set apart for the maintenance of highways. They may then make application for State aid, and shall certify that said additional sum has been raised and set apart. Such application must be made on or before May 1 of each year.

The governor and council shall apportion to each city, town or unincorporated town which has raised such additional amount for each $1 so raised and set apart, the following amounts:

Towns, unincorporated towns, and places, having a valuation of less than $100,000, $3 for each $1 so set apart. Towns, and unincorporated towns, and places having a valuation of $100,000 and less than $250,000, $1.25; towns, and unincorporated towns and places having a valuation of $250,000 and less than $500,000, 60 cents, towns having a valuation of $500,000 and less than $1,000,000, 40 cents; cities and towns having a valuation of $1,000,000 and less than $3,000,000, 25 cents; and cities or towns having a valuation of $3,000,000 and upwards, 20 cents.

The amount so set aside and the amount apportioned by the governor and council, shall constitute a joint fund for the permanent improvement of such highway or highways within such city or town as the governor and council, and the local authorities may designate, provided no part of such joint fund shall be expended on any highway within the compact portion of any city, town, or village, such compact portion to be determined by the governor and council, except in towns of less than 2500 population. Such cities, towns and unincorporated towns and places as do not apply for State aid, may expend the money first set apart for the permanent improvement of such highways as the local authorities may select.

Any part of said joint fund not expended during the year for which it is set apart and apportioned, may be expended during any succeeding year.

State Bonds.—The treasurer of the State, under the direction of the governor and council, is authorized to issue not to exceed $1,000,000 in State bonds, bearing not to exceed 3½ per cent interest, payable semi-annually, in such sums, and for such length of time, not exceeding thirty years, as the governor and council may determine. Such bonds shall be called the highway bonds, and shall not be sold for less than par. The amount so issued shall not exceed, in any one year, one-fourth the total amount authorized. The proceeds of said bonds shall be paid upon warrants drawn by the governor, but shall not be used for the maintenance of highways, or for any other purpose than the constructing and improvement of permanent highways.

There is annually appropriated $125,000 for paying the interest and annual installments of the principal of the bonds, and for the permanent improvement of main highways, and for the maintenance of State highways. Any unexpended balance shall be added to the appropriation for the succeeding year. Upon the sale of such bonds the treasurer shall estimate the amount necessary to be set aside annually to pay the interest and principal on same. The remainder, after deducting the amount necessary for administration, and road maintenance, shall be available, together with the proceeds from the sale of said bonds for State aid and the construction of State highways.

Maintenance.—The law provides that 65 per cent of the fees and fines collected from the motor vehicle law shall be used for the maintenance of the trunk line roads and 35 per cent to be used for the maintenance of roads not on trunk lines.

Synopsis of Automobile Law

Registration.—Annual, with secretary of State, Concord, N. H.

Fees—Residents.—Automobiles owned by residents of New Hampshire: Not exceeding 15 horse-power, $10; exceeding 15 horse-power and not exceeding 30 horse-power, $15; exceeding 30 horse-power and not exceeding 40 horse-power, $20; exceeding 40 horse-power and not exceeding 50-horse power, $25; exceeding 50 horse-power and not exceeding 60 horse-power, $30; exceeding 60 horse-power, $40.

Between October 1 and December 31 of each year, one-half of the above named fees.

Horse-power to be determined by A. L. A. rating.

Dealer's fee, $40 per year.

Livery fee, regular registration fee per car.

Commercial vehicle, $10 per year.

Transfer of registration from registered car to another (same owner), $2 plus difference in horse-power rating, if any.

Fees—Non-Residents.—For more than a total of ten days in any year (for which time cars registered in the owner's home State are exempt), the same fees as residents except that for registration for July, August and September non-residents pay half rates.

Operators and Chauffeurs.—Private operator, original license, $3 for calendar year; renewal, $1 for calendar year. Non-residents, the same—after ten days' exemption in a calendar year for holder of home registration.

No person under sixteen years of age can be licensed as private operator.

Professional chauffeur, original license, $5 for calendar year; renewal, $1 for calendar year. Non-residents, the same—after ten days' exemption in a calendar year for holder of home registration.

No person under eighteen years of age can be licensed as a professional chauffeur.

Chauffeurs must wear badges furnished by secretary of State.

Operators and chauffeurs not previously licensed must pass secretary's examination.

NEW JERSEY

State Highway Officials.—The State highway commission consists of the governor, president of the senate, speaker of the house of assembly, who serve without compensation other than actual expenses, and the commissioner of public roads.

The commissioner of public roads is appointed by the governor, for three years, at $5000 per year. His staff are civil service employees who hold office unless removed for cause, and a supervisor of public roads, commonly known as the chief engineer.

The commissioner is allowed about $8000 per year for clerk hire and the necessary expenses of himself and his supervisor, also $3000 for the necessary expenses of the assistant supervisors.

In addition to the above, the commissioner appoints a local supervisor or inspector for each contract, paying him $3 per day for each day's actual service.

The bituminous binders and other road materials are tested in the laboratories of the State Geological Survey.

Automobile Registration.—The motor vehicle department is a separate organization attached to the office of secretary of State. The net amount received from licenses, fines, etc., are turned over each month to the commissioner of public roads to be used for the maintenance of public roads.

State Aid.—The commissioner of public roads, after conferring with the freeholders and other local authorities, decides upon the roads to be built, improved or maintained with the aid of State moneys. The surveys, including plans, profiles, cross sections, calculations and specifications, must be approved by him before it is lawful for the local authorities to advertise for bids. Later the contracts and bonds are examined and approved by the commissioner before work begins. After the work has been completed to the satisfaction of the local authorities and a statement in writing to the effect, together with a statement of cost, has been submitted by them, the commissioner satisfies himself that the work is properly done and then accepts it on the part of the State, after which the State's portion, amounting to 40 per cent of the cost, is sent to the county.

The law was revised in 1912 and provides that the board of chosen freeholders in each county may before approval require that the township or other municipalities shall pay 10 per cent of the cost to apply toward the county's share. At least 5 per cent of the contract price shall be withheld until one year after the completion of the work and acceptance in writing by the commissioner of public roads.

Maintenance.—After approval by State commissioner of contracts under this act such roads shall forever after be county roads and their repair shall devolve exclusively upon the board of freeholders and the county supervisor to the exclusion of all township or other municipal officers. If any such road shall not be repaired within sixty days after notice in writing by the State commissioner he shall certify to such neglect to the State comptroller who shall withhold payment to such county of moneys already apportioned or that may thereafter be apportioned.

By an act passed in 1912 the State commissioner of public roads is authorized to assume on behalf of the State a part of the cost of new bridges or culverts under conditions and for design approved by him in no case to exceed 20 per cent of the cost.

Duties of Local Authorities.—The laws apply to counties, townships, towns, boroughs, villages, or any municipalities except cities. Counties may build and maintain roads at their own expense provided the question is approved by a majority of the legal voters at an election for the members of the General Assembly, but to secure State aid it is necessary to make application to the commissioner of public roads, and, after receiving the general approval of a route, the freeholders instruct the county engineer to make surveys and prepare plans, profiles, cross sections, calculations and specifications which will meet the approval of the commissioner. Advertisements for bids are placed in local and engineering publications for three weeks, after which bids are publicly opened and the lowest bidder who can furnish satisfactory references and bonds receives the contract, the board of freeholders and commissioner of public roads always reserving the right to reject any or all bids.

It is the duty of the freeholders to maintain all county roads firm, smooth and convenient for travel at all seasons. The freeholders are required to appoint a county supervisor of roads, paid from the county funds and responsible to the freeholders and the commissioner of public roads for the condition of the roads.

The county engineer is appointed and paid in the same way.

Should the counties desire, and the officials of townships, town, borough, or other municipal body petition, any county road passing through its territory may be turned over to that body. Any of the above-named bodies may, upon the approval of the commissioner of public roads, acquire by condemnation or otherwise any toll road and receive one-third of the purchase price and one-third of the cost of improvement from the State aid moneys, provided that the State's share in any one year does not exceed $50,000. Nearly all the toll roads in New Jersey have already been acquired in this way.

It is lawful for counties to raise money for all kinds of road building and repairs by taxation or by bonding.

When a township or municipality has undertaken to pay 10 per cent of the cost of improvement under this act the township committee or other governing body may issue bonds for such amount.

The boards of freeholders are authorized to acquire quarries, gravel pits, etc.

Abutting Property Owners.—Some of the counties take advantage of the law which requires the abutting property owners or the township to pay 10 per cent of the cost of improvement and in many cases much more than this amount is subscribed by local citizens to induce the early adoption of certain lines.

State Aid Funds.—The legislature annually appropriates about $400,000 for new work or construction to which the State contributes 40 per cent and the county 60 per cent of the cost.

State Highways.—The State highway commission is directed to establish a State highway system forming a continuous or intercommunicating system of improved main traveled roads connecting county seats, seaside resorts, large centers of population, outlets at the boundaries of the State, the Ocean Highway and the Delaware River Drive, and the State commissioner of public roads is directed to submit to the State highway commission a map showing the proposed system. The aggregate mileage of such system shall not exceed 1500 miles. The State commissioner of public roads is directed to take charge of the construction, improvement, maintenance and repair of the State highways; all such work shall be done at the expense of the State in accordance with plans and specifications prepared by the State department of public roads and under supervision of the State commissioner of public roads. The State supervisor of roads shall be known as the State highway engineer and the assistant State supervisors as division highway engineers. The State commissioner is empowered with the approval of the State highway commission to employ not more than two additional highway engineers and such draftsmen, clerical and other assistance as shall be needed. The act provides that county engineers shall where practicable be made resident engineers for the purposes of this act.

The work of construction and of extensive repairs on State highways shall be by contract after advertisement for bids.

The State road fund shall include the appropriations made by the legislature, the receipts for motor vehicles licenses, and fines for violation of this act.

At the end of each fiscal year the State commissioner of public roads shall make a financial report to the State comptroller.

NEW MEXICO

State Highway Officials.—The State good roads commission consists of the governor, the commissioner of public lands, and the State engineer, all serving without compensation. The State engineer is the active member and the road construction work is under his immediate direction.

A commission consisting of the president of the New Mexico

Historical Society, the governor of the State, and the mayor of the City of Santa Fe, is created for the purpose of designating and marking by suitable stone monuments the old Santa Fe Trail as it existed within the boundaries of the territory.

Duties of State Highway Officials.—The State roads commission shall meet at least four times a year and shall have general charge of all highways constructed or maintained in whole or part by the aid of State moneys: they may prescribe rules and regulations determining the methods of construction and improvement of highways under their charge. They shall construct and maintain at the expense of the State wholly or in part such public roads as will best serve the interests of the general public. The system of highways previously established by laws in the state and the use of convict labor on such highways shall be under the supervision of the roads commission.

They shall investigate the needs of the various localities in regard to public highways and determine what roads shall be constructed or repaired, and shall coöperate with the county commissioners in such work. They may solicit and receive funds and other coöperation from firms, individuals, associations, or corporations.

The State engineer is subject to the order of the roads commission and has supervision of the construction, maintenance, and repair of all highways and bridges under this act. No county bridge which exceeds in cost $1000 shall be constructed until the State engineer shall have first approved the site, contract and specifications for said bridge.

Duties of Local Officials.—The commissioners of the county through which all proposed roads pass are required to secure the right of way where necessary and to construct the necessary bridges thereon.

Road Revenues and Expenditures.—The roads commission is authorized to cause to be levied annually a tax not to exceed 1 mill upon every dollar, the proceeds to constitute a "road fund" subject to the orders of the roads commission. An appropriation of $1000 was made for marking the old Santa Fe Trail.

Convict Labor.—The board of penitentiary commissioners shall furnish such convicts for road work as may be available upon request from the roads commission, and shall also furnish guards upon request of said commission. The expenses of transporting and maintaining prisoners while engaged upon road work shall be paid by the roads commission.

NEW YORK

Classification of Highways.—The highways are divided into: (1) State highways improved at the sole expense of the State; (2) County highways improved at the joint expense of State, county and town; (3) County roads improved and maintained by the county, in such counties as have adopted the county road system; (4) Town highways constructed and maintained by the town with the aid of the State.

State Department of Highways.—The governor shall appoint a State superintendent of highways, who shall receive an annual salary not to exceed $8000, and hold office during the pleasure of the governor. The State superintendent of highways, the State engineer and surveyor, and the superintendent of public works, constitute the State commission of highways. The State superintendent, with the consent of the commission, shall appoint two deputies, each of whom shall be a practical road builder. The first deputy shall have charge of the maintenance of the State and county highways, and the second deputy of the improvement and maintenance of town highways and bridges. The commission shall appoint a secretary. The State superintendent of highways shall, with the consent of the commission and subject to civil service regulation, appoint resident engineers, clerks and other employees. Inspectors of construction shall be residents of the county in which the highway to be improved is located.

The commission shall (1) have general supervision of all highways and bridges constructed or maintained, in whole or in part, by the aid of State money; (2) Prescribe rules and regulations fixing duties of division engineers, district, county and town superintendents, in respect to State and county systems; (3) Aid district, county and town superintendents by advice on construction and maintenance of highways and bridges; (4) Cause plans, specifications and estimates to be prepared when requested by district, county or town superintendents; (5) Investigate methods of road construction and maintenance, (6) Compile statistics; (7) Cause public meetings to be held at least once each year, in each district or county; (8) Approve and determine final plans, specifications and estimates for State and county highways upon receipt of report and recommendations of county or district superintendent, and transmit the same in the case of a county highway to the board of supervisors. After approval by the board of supervisors the commission shall cause contract to be let for such improvement; (9) Prepare tables showing total number of miles of highways in State, by towns and counties.

The commission shall divide the State into not more than six divisions, and assign to each a division engineer at a salary of

$3000 per annum. The division engineer shall, under the direction of the commission, make surveys, maps, plans, specifications and estimates for the construction and maintenance of State and county highways, and inspect the work performed on any highways, and report to the commission and the State superintendent of highways, as to whether the work has been done in accordance with specifications and contracts. They shall also provide the monthly estimates for work performed under contracts, and inspect from time to time all State and county highways, and consult with district, county and town superintendents.

Estimate of Cost of Maintenance.—The commission shall have all State and county highways inspected annually and a report prepared showing in detail the condition of the highways inspected, the necessary improvements to be made and the estimated cost thereof, and report annually to the legislature the amount required for maintenance for the ensuing year.

District or County Superintendents.—The board of supervisors of any county may appoint a county superintendent of roads and fix his salary. His term of office shall be four years unless sooner removed by the board.

If the board fails to appoint a county superintendent, the commission shall appoint a county superintendent from the eligible list of the county and fix his salary, or, in its discretion, place such county in a district with other counties and appoint a district superintendent therefor. No district shall contain more than 5000 miles of public highways. The commission may remove a county or district superintendent upon written charges and hearing.

The district or county superintendent shall, subject to the regulations of the commission and the State superintendent of highways, have general charge of all highways and bridges in his district or county.

Town Superintendents.—At the biennial town meeting there shall be elected in each town a town superintendent of highways, who must be a resident of the town, The town may, after petition of taxpayers, vote to have the town superintendent appointed instead of elected. In such case the town board shall appoint a superintendent to hold office for the biennial term. The town board may in its discretion appoint a deputy town superintendent. The compensation of the superintendent and his deputy shall not be less than $2 nor more than $5 per day. The town superintendent shall, subject to the regulations of the commission, have the care and supervision of the highways and bridges of the town and cause them to be kept in repair and free from obstructions, and shall make inspections during October and April. He may employ such persons and teams as may be necessary. He shall inspect all highways which shall be improved as State or county highways when so directed by the district or county superintendent. He shall report annually on such date as may be set by the commission, prior to November 15, to the district or county superintendent in relation to the highways and bridges in his town.

Contracts for Construction of Town Highways.—A town board may provide that construction, the cost of which will exceed $500, shall be done under contract to be awarded by the town superintendent in accordance with the estimates, plans, and specifications, to be furnished by the district or county superintendent or by the commission. Contracts are subject to the approval of the district or county superintendent.

Measurement of Highways and Report.—The town superintendent shall measure the highways of his town as the State commission shall direct, and shall indicate in his report the town highways which have been surfaced with gravel, those which have been surfaced with crushed stone, and those which have been shaped and crowned.

Application for Service of Prisoners.—The town superintendent may with the consent of the town board, request the supervisors of the town to secure the service of the prisoners in the county jail for work upon the county highways.

State Aid.—The town superintendent shall annually on or before October 31, make a statement of the money which should be raised by taxes in the town for the ensuing year for repair or improvement of highways. Such amount shall not be less than an amount which when added to the amount received from the State will equal $30 for each mile of highway within the town. The town board shall consider such estimates and after approval by them, the town clerk shall transmit a copy of such approved statement to the commission. The supervisor shall also submit such statement to the board of supervisors and such board shall cause the necessary taxes to be levied and collected in such town. Certain limitations as to the amounts to be raised by the town board through taxation are made by law. The supervisor may when authorized by the town board borrow money in anticipation of the taxes to be levied and collected. Towns may borrow money upon bonds if authorized at a regular or special town meeting.

There shall be paid by the State to the towns an amount based upon the taxes levied therein, as follows: (1) Where the assessed valuation is less than $5000 for each mile of highway in such town, outside of incorporated villages, an amount equal to the amount of such taxes; (2) Where such assessed valuation is $5000 or over and less than $7000 for each mile, an amount equal to 90 per cent of such taxes; (3) Where such assessed valuation is $7000 or over and less than $9000 for each mile, an amount equal to 80 per cent of such taxes; (4) Where assessed valuation is $9000 or over and less than $11,000 for each mile, an amount equal to 70 per cent of such taxes; (5) Where such assessed valuation is $11,000 or over and less than $13,000 for each mile, an amount equal to 60 per cent of such taxes; (6) Where the assessed valuation is $13,000 or over for each mile, an amount equal to 50 per cent of such taxes. Provided that no town shall receive in any one year under this section an amount exceeding an average of $25 per mile for the total mileage of its highways, outside of incorporated villages. In towns where the assessed valuation of real and personal property averages more than $25,000 for each mile of highway, the amount paid shall not exceed one-tenth of 1 per cent of such assessed valuation.

The State controller determines the amount due the several towns and draws his warrant upon the State treasurer in favor of the county treasurer, for the total amount to be paid to the towns in such county, and the county treasurer pays to the supervisor of each town the amount to which such town is entitled. The supervisor of the town is the custodian of the highway funds and is responsible therefor, and shall present to the town board annually a report showing the money received from the State; from taxes levied and collected; from the issuance and sale of bonds and certificates of indebtedness, and from penalties. He shall also show the expenditures during the year. The clerk of the board of supervisors shall transmit three copies of the proceedings of the board of supervisors containing such report to the State highway commission, and three copies to the State controller. The State highway commission prescribes method of keeping town accounts of moneys received and expended.

State Highways.—A system of State highways is set forth in the highway laws of the State and the routes described. Such State highways are to be improved from the funds derived from the sale of State bonds. The law provides that not more than one-half of the amount appropriated each year from the proceeds of such bonds shall be expended in the construction and improvement of State highways. The State highways are constructed entirely at the expense of the State.

County Highways.—The board of supervisors of any county may pass a resolution requesting that a certain designated highway be improved as a county or State highway. The commission after receipt of such resolution shall examine the highway and approve or disapprove such resolution. If it approves it shall direct the division engineer to make surveys and prepare plans and specifications. The commission shall then cause such plans and specifications to be sent to the district or county superintendent, who shall personally examine the highway and recommend any modifications that may be necessary. The commission may then finally adopt the plans, specifications and estimates, and if such highway be a State highway the commission shall proceed to advertise and award contracts. If it be a county highway, the commission shall transmit the plans, specifications and estimates to the board of supervisors of the county for final approval. When final approval has been obtained the improvement of such county highway shall be taken up and carried forward by the commission. State and county highways shall be improved by contract. The performance of every contract for the construction or improvement of a State or county highway shall be under the supervision and control of the State superintendent of highways, and he has supervision over the deputies, division engineers, and employees, except the secretary of the commission. Upon the completion of a State highway the division engineer with the county or district superintendent shall inspect the same and report to the State superintendent and if he approves he will report to the commission for final approval.

The resolution of the board of supervisors of any county for the improvement of a county highway shall appropriate an amount sufficient to pay the share of the cost to be borne by the county and town. After final payment under a contract for improvement of a county highway the State commission shall prepare a statement of cost and a duplicate shall be filed with the county treasurer. If the county board of supervisors shall have theretofore provided funds to pay 2 per cent of the cost of such county highway for each $1000 of assessed valuation of real and personal property in said county, for each mile of public highway in such county, and have theretofore provided funds to pay on behalf of the town 1 per cent of the cost of such highway for each $1000 assessed valuation of real and personal property in said town for each mile of highway within said town, not to exceed 35 per cent of the cost for the county and 15 per cent for the town, it shall be the duty of the county treasurer to pay the amount thereof upon the requisition of the commission.

The county treasurer is authorized to borrow a sufficient amount to pay such share in anticipation of taxes to be collected therefor. The board of supervisors may by resolution authorize the issuance of county bonds to an amount not exceeding the share of the county as apportioned by the commission.

Maintenance of State and County Highways.—Maintenance and repair of State and county highways shall be under the direct supervision and control of the commission, except the cost of maintaining bridges having a span of five feet or over. The work shall be performed by the town or the district or county superintendent subject to the supervision of the State superintendent of highways. The State commission also has power to provide for a system of patrol of such highways, or adopt such other system as may be expedient to secure constant observation and maintenance. The State superintendent appoints the patrolmen subject to the approval of the commission and he has power to purchase materials for such maintenance.

An annual appropriation is made for maintenance of State and county highways upon estimates submitted by the commission to the legislature. Each town shall pay for the maintenance of State and county highways each year $50 for each mile of said highways within the town. Each incorporated village shall pay for such maintenance 1½ cents for each square yard of surface maintained by the State within its corporate limits, and each city of the third class shall pay at the rate of 3 cents for each square yard maintained by the State within the incorporated limits. The amount apportioned by the commission for the maintenance of State and county highways in each town or city together with the amount paid by each town or city shall be expended for the maintenance of such hty ways.

Whenever any county has constructed or maintained a county road without expense to the State, the State shall annually contribute to the expense of maintaining such road 50 per cent of the amount appropriated by such county for the maintenance of such road during the preceding year. The sum paid by the State for this purpose shall not exceed in any one year one-tenth of 1 per cent of the taxable property in such county.

Construction of Highways by County and Town.—The county supervisors may provide for the construction or improvement of a highway in one or more towns at the joint expense of the county and town and determine the proportion of expense to be borne by the county and town respectively.

State Road Funds.—A State bond issue of $50,000,000 was authorized in 1906, of which there had been appropriated to 1911 inclusive $48,955,000 leaving a balance unappropriated of $1,045,000. The $50,000,000 issue of bonds authorized by the constitutional amendment was originally intended for the improvement of a system of county highways aggregating about 8380 miles. To this mileage was added a system of State routes aggregating 3300 miles, the entire cost of the latter to be paid by the State. An additional State bond issue of $50,000,000 was voted in 1912 to complete the system of State and county highways.

Additional State Bond Issue.—The legislature enacted in April, 1912, a law providing for an additional State bond issue of $50,000,000 for constructing and improving the State and county highways. The law provided that $20,000,000 of this sum shall be used solely for the construction and improvement of State highways, and $30,000,000 solely for the construction and improvement of county highways, the apportionment among the counties to be computed on the following basis: on the population as fixed by the federal census of 1910; on the measured mileage of public highways outside of cities and villages, and on the total area; the sum of one-third of each of these three factors to constitute the basis of apportionment. It is provided that the construction and improvement of these highways shall be under the control of the State commission of highways. This law was submitted to the people at the general election in November, 1912, and ratified.

Other Recent Legislation.—The legislature enacted a law in April, 1912, providing that State or county highways may be constructed through cities of the second or third class or a village in the same manner as outside. If a county highway be constructed through or within a city of the second or third class the board of supervisors of the county shall apportion the cost between the county and city as follows: 15 per cent of the cost to be borne by the city and 35 per cent by the county.

NORTH CAROLINA

State Highway Officials.—The North Carolina geological board is authorized to advise with the township and county authorities in the construction and improvement of the public roads, giving said local authorities advice as to the best methods of highway and bridge construction. The said board through the State geologist may make inquiry in regard to systems of road building and management, make investigations and experiments concerning best methods of road construction and the best kind of road material and disseminate such information by lectures and the publication of bulletins and reports.

State Highway Fund.—The sum of $5000 is annually appropriated for the purpose of carrying out the provisions of this act.

Convict Labor.—When any county has made provisions for working convicts upon public roads the judge holding court in such county shall sentence the following convicts to such work; first, all persons convicted of crimes, the punishment of which is imprisonment in the county jail; second, where the punishment is confinement in the State prison not exceeding ten years; third, those sentenced to imprisonment in the county jail by a magistrate, and insolvents for non-payment of costs in criminal cases.

Local Administration.—Nearly every county in North Carolina has special laws governing the method of road construction, taxation for roads, etc. In some of the counties the roads are worked with the county as a unit, and in others with the township as the unit, the county sometimes having control of the work in each township, but often each township has direct control of its own roads. In many of the counties all able bodied men are still required to work a certain number of days on the public roads or in lieu thereof pay a certain sum into the township or county treasury for road work. The legislature has authorized the county commissioners of many of the counties to levy special road taxes varying from a few cents to fifty cents on the $100 worth of property, and this is done at the discretion of the county commissioners. The legislature has also in many counties authorized the county commissioners to call an election regarding the issuance of bonds for road purposes.

NORTH DAKOTA

State Highway Officials.—A law was passed in 1909 establishing a good roads experiment station at Bismarck for ascertaining the most practical and economical construction and maintenance of public roads in the State. The board of trustees of public property has general supervision over the roads constructed under this act.

The State engineer is required to furnish plans, specifications, and supervise the construction and maintenance of the roads constructed under this act subject to the general control by the board of trustees.

Convict Labor.—To carry out the provisions of this act the warden of the State penitentiary, upon requisition of the board of trustees of public property, shall furnish convict labor not otherwise employed.

The trustees of the penitentiary may employ convict labor for improving the roads and streets used as approaches to the penitentiary, the capitol, or other public institutions.

Roads to be Improved.—The roads designated for improvement under the experiment station act are those leading from the State capitol to the military reservation at Fort Lincoln, and from the State penitentiary to the Missouri River.

Concurrent Resolution.—A concurrent resolution was passed by the 1911 session of the legislature providing for an amendment to the constitution which will enable the State to grant aid in the construction of highways. If this passes the 1913 session it will be submitted to a vote of the people, and if passed, laws providing for State aid in the construction of highways can be passed by the 1915 session of the legislature.

County Superintendents of Highways.—A law was also passed providing that the county commissioners may at their option appoint a county superintendent of highways and deputy superintendents in organized counties, who shall have charge and supervision of the construction, improvement and maintenance of roads within said counties.

Automobile License.—A law was passed by the 1911 session of the legislature providing for a license fee of $3 for each motor vehicle operated, and the law further provides that the money received for licenses, less the cost of tags and clerical expenses, shall be returned to the county from which it originates to be used for maintenance and repair of highways.

Local Administration.—In counties having no civil township organization, the county board of commissioners act as a highway board; in organized townships the authority is vested in the board of supervisors. In localities where there are unorganized townships the county commissioners may create as many road districts as in their judgment is deemed expedient, and may appoint for each district a road supervisor. Township supervisors may divide the township into as many road districts as may be required, but this must be done at least twenty days prior to the township elections. Road overseers are elected annually. In counties where county superintendent of highways is appointed, the deputy county superintendents are appointed to take the place of road overseers.

Road Revenues.—Highway maintenance funds are secured by poll and property taxes and automobile and motor cycle licenses, as stated above. A poll tax of $1.50 is levied on every male person between the ages of twenty-one and fifty years, and a property tax from 1 to 5 mills on the dollar may be assessed by the county, which may be paid in cash or by labor at the rate of not less than $1.50 nor more than $2 per day. The township may levy a maximum highway tax of 8 mills on the dollar, which may be paid in cash or by labor at the rate of not less than $1.50 nor more than $2 per day.

OHIO

State Highway Officials and Their Duties.—The highway department shall be divided into the bureau of construction, the bureau of maintenance and repair, and the bureau of bridges. The governor shall appoint a State highway commissioner for four years, at a salary of $4000 and necessary traveling expenses, not to exceed $1200 in any one year. He shall be a competent civil engineer and experienced in the construction and maintenance of roads and bridges. He shall give a bond of $10,000.

Subject to the approval of the governor, the State highway commissioner shall appoint three deputy highway commissioners, not more than one of whom shall be of the same political party as himself, who shall be competent civil engineers, and serve during the pleasure of the commissioner. One of these deputy highway commissioners shall be experienced in road construction and improvement, and acting under the direction of the highway commissioner, shall have supervision of all matters pertaining to road construction and improvement. Another shall be experienced in road maintenance and repair, and acting under the direction of the highway commissioner shall have supervision of all matters pertaining to road maintenance and repair. Another shall be experienced in the design, construction, and maintenance and repair of culverts and bridges, and acting under the direction of the State highway commissioner, shall have supervision of all matters pertaining to the design, construction, maintenance and repair of culverts and bridges.

The highway commissioner shall appoint not to exceed eight division engineers, one chief clerk and not to exceed eight clerks or stenographers.

The State highway commissioner shall have general supervision of the construction, improvement, maintenance and repair of all highways, bridges and culverts which are constructed, improved, maintained or repaired by the aid of State money. He shall aid county commissioners in establishing, creating and preparing suitable systems of the drainage of highways, and advise with them as to the construction, improvement, maintenance and repair of highways, and the design, construction, maintenance and repair of bridges and culverts. He shall cause plans, specifications and estimates to be prepared for the construction, maintenance or repair of bridges and culverts, when so requested by the authorities having charge thereof; he shall carry into operation laws providing for the coöperation of the State with local authorities in the construction, improvement, maintenance and repair of public roads, bridges and culverts. He shall make inquiry into the systems of road and bridge construction and maintenance throughout the United States, conduct investigations and experiments in regard to the best methods of road and bridge construction and the best kinds of road and bridge materials, and he may prepare bulletins and reports. He may cause to be made surveys, plans, profiles, specifications and estimates of "inter-county highways."

He shall call an open meeting within each county at least one day in each calendar year, for affording instruction relative to road and bridge construction, maintenance and repairs. Such meeting shall be conducted by the State highway commissioner or one of the deputies or division engineers.

The apparatus and supplies of the College of Agriculture and Engineering of the Ohio State University may be used by the State highway commissioner in making investigations concerning the chemical and physical character of road and bridge materials, if the president of such university consents, and such investigations are made without interference with the regular work of the university.

It shall be the duty of the State highway commissioner and his deputies to determine from the statistics and information furnished by the county and township officials, the relative importance, and value for commerce, of the various public highways of the entire State. They shall designate by name and number the main roads of the State which shall be known as "inter-county highways;" and the parts thereof in each county shall be designated so as to form as near as practicable continuous and connected highways and shall designate the order of their relative importance within the county. They shall complete the work and file their report with the governor within 240 days from the date of commencing the work, unless further time be granted them for such purpose by the governor. So much of such report shall be printed under the direction of the State highway commissioner as he may deem necessary and a copy thereof shall be immediately furnished the board of county commissioners of each county of the State and shall be preserved in the office of the county auditor. After the filing of such report the State highway commissioner may, subject to the approval of the governor, designate additional roads as "inter-county highways."

He is authorized to pass upon applications from the county officials for State aid. Applications not approved by him are placed on file for future action, or until withdrawn by the county commissioners, with the consent of the highway commissioner. After the commissioner has approved an application for State aid, such approval being based on the location and value of the road sought to be built, he shall cause a map of the highway in outline and profile to be made, and suitable plans and specifications for a roadway to be prepared. He shall also cause to be made plans and specifications for all bridges, and culverts necessary on the highway or section thereof, and shall transmit a copy thereof to the county commissioners, who shall construct such bridges and culverts in accordance with said plans. Upon the completion of the maps, plans and specifications, he shall cause an estimate of cost of construction to be made, and transmit a copy thereof to the county commissioners, who may approve the construction of said road, transmitting a certified copy of their resolution to the State highway commissioner. Upon the receipt of such resolution the commissioner shall advertise for bids, and, subject to the approval of the county commissioners, award the contract for such work to the lowest bidder, provided said bid be within the estimated cost of said road. If no acceptable bid is received within the estimated cost, the commissioner may re-advertise or amend such estimates and certify the same to the county commissioners. If the county commissioners adopt said amended estimate, bids may be again advertised for, and contract awarded, the State highway commissioner having the right to reject any or all bids. Upon the completion of the work, the said commissioner shall ascertain the cost of such improvement, and apportion same as provided for by law.

In the event of more than one township in a county making application for road improvement, the State highway commissioner shall select such roads named in the application, as he deems to the best interests of the public. He shall also make final decision as to the materials to be used in the construction of any road.

Highways improved or constructed under the provisions of any act providing for aid by the State shall be kept in repair and maintained by the State highway commissioner. The expense of such repair and maintenance shall be divided and payable 25 per cent thereof by the State, 50 per cent thereof by the county and 25 per cent thereof by the township or townships. The State's share being payable from moneys appropriated by the general assembly for the purpose; the county and township shares from their respective road or road repair funds.

Local Officials and Their Duties.—The commissioners of a county may, by a properly certified resolution setting forth that the public interests demand the improvement of a certain highway, described therein, make application to the State highway commissioner for aid from a State appropriation for the construction and repair of highways. Such application must be made prior to May 1, preceding the date when such appropriation becomes available, and shall not include any portion of a highway within the limits of a city. Upon failure of the county commissioners to make such application within said time limit, the trustees of a township of such county may apply prior to July 1 next succeeding in like manner for aid from such appropriation. Such application shall contain an agreement on the part of such township to pay one-half of the cost of construction, including surveys and other necessary expenses, by an assessment on the township of 35 per cent and 15 per cent on the property fronting on such road or highway. The State highway commissioner may act on the application of said township trustees in same manner as upon applications made by county commissioners. And if the township trustees do not make use of the appropriation prior to July 1 next succeeding, then the State highway commissioner shall have full power and authority to enter upon and construct, improve, maintain or repair any of the inter-county highways or parts thereof, of said county, either by contract, force account, or in such manner as he may deem for the best interests of the public, paying the full cost and expense thereof from the apportionment of the appropriation to said county so unused.

Upon the receipt of an approval of an application from the State highway commissioner, together with proper plans, maps, and specifications, the county commissioners or township trustees may, by a majority vote, adopt a resolution authorizing said highway to be constructed, transmitting a copy of such resolution to the State highway commissioner. If the lines of a proposed highway deviate from those of an existing highway, the officials making said application must provide the requisite right of way, and secure proper releases of damages, prior to the commencement of the work.

The county commissioners may, upon the petition of the owners of 51 per cent of the lineal feet of adjacent property, order the improvement of a public road, or section thereof, at least one mile in length, or less than one mile if it is an extension or connected with a permanently improved street or highway of improved construction. And they may require that the township or townships through which such road extends shall pay 25 per cent of the cost, and that the trustees thereof shall approve same. The county commissioners by resolution may relieve the township or property owners from any assessment. If more roads are petitioned for than can be constructed in any one year, the State highway commissioner and the county commissioners shall decide upon the road to be first improved, having in mind the importance of such road to the county or township.

No contract for road improvement unless otherwise provided shall be let until the county commissioners and trustees of the township in which such improvement is to be made, shall enter into agreement to assume their respective share of the cost thereof.

The county commissioners of any county may waive any or all of the apportionment of the expense of highway improvement to be paid by townships or abutting property owners, and assume any part or all of the cost of such road improvement; and the township trustees may, in like manner, waive any or all of the apportionment of the expense to be paid by the county or abutting property owners, and assume any part or all of the cost of such road improvement in excess of the amount received from the State.

Road Revenues and Their Distribution.—Whenever there are one or more improvements to be made in any county and the cost and expense thereof is equal to or is less than twice the amount apportioned by the State to a county, then the State shall pay 50 per cent of such cost and expense.

Whenever there are one or more such improvements to be made in any county and the cost and expense thereof exceeds twice the amount apportioned by the State to a county, then the State shall pay the amount of the apportionment for said improvement or improvements apportioned as may be agreed upon by the State highway commissioner and the county commissioner.

Except as otherwise provided, the county shall pay 25 per cent of all cost and expense of improvement.

Except as otherwise provided, one-fourth of the cost and expense of such improvement shall be apportioned to the township or townships in which such road is located. Of the amount so apportioned three-fifths shall be a charge upon the townships and two-fifths shall be a charge upon the property abutting on the improvement. The township trustees shall apportion the amount to be paid by the owners of the abutting property according to the benefits accruing to the owners of land so located. At least ten days' notice of the time and place of making such apportionment shall be given to the persons affected thereby, and an opportunity given them to be heard. If the improvement lies in two or more townships the amount to be paid by each shall be apportioned according to the number of lineal feet of the improvement lying in each township.

When an improvement of a highway shall be made by the State in conjunction with a township, 35 per cent of the total cost and expense shall be assessed on the township and 15 per cent of the total cost and expense thereof shall be assessed on the land abutting on such highway.

The amount appropriated for State aid shall be equally divided among the counties of the State, but shall remain in the State treasury until applied for.

County commissioners or township trustees may, by unanimous vote, provide for bonds bearing not to exceed 5 per cent interest, for the payment of the cost of a highway under the provisions of this act. At their March and June sessions each year the county commissioners may levy not exceeding 1 mill for the creation of a "State and county road improvement fund," such amount to be used for the improvement of State and county roads within the county, and be in addition to the amount levied for road and bridge purposes.

Automobiles.—Motor vehicles shall be registered by the secretary of State, and the payment of a fee of $5 for gasolene or steam motor vehicle, and $3 for an electric vehicle. Chauffers are required to pay a license fee of $2 for operating motor vehicles. Manufacturers and dealers may pay a registration fee of $10 and be relieved from any individual registration of motor vehicles. Non-residents shall be exempt from the payment of any tax, provided they shall have complied with the laws of their own State, and the laws of both States be substantially the same with regard to motor vehicles. Heavy penalties are provided for the violation of this act. The revenues derived from the registration fees, shall, after the payment of expenses, be paid into the State treasury monthly, by the secretary of State, and shall be maintained as a separate fund for the improvement, maintenance and repair of public roads and highways, and shall be apportioned in the same manner as the State highway fund.

Braun County Aid Law.—The board of commissioners of any county are authorized under this act to lay out, construct or improve any public roads.

When a majority of the owners of real estate lying within one mile of any public road shall present a petition to the county commissioners asking for the improvement or alteration of such road and file bond with security for the payment of the cost of the preliminary survey, the county commissioners may appoint the county surveyor as engineer to make surveys, estimates and specifications. When such road is on a county line between two or more counties the commissioners shall file certified copy of the petition and bond with the commissioners of each of the counties touching the road. The several boards of county commissioners shall thereupon act jointly.

When the improvement is wholly within one county the commissioners shall after receipt of estimate of the engineer publish notice that the improvement is about to be made. If the road is on a county line the engineer shall transmit his report to each board of county commissioners and they shall each publish notice that improvement is about to be made. Claims for damages shall be filed in writing with the board of county commissioners of the county in which the land is situated. After hearing the board of county commissioners may order that improvement be made and adopt plans and specifications.

After making such order the work shall be let by the county commissioners or the joint board to the lowest responsible bidder who shall give bond.

When the improvement is wholly within one county the cost of said improvement shall be apportioned by the commissioners as follows: Not less than 35 per cent nor more than 50 per cent shall be paid from levy upon the taxable property of the county; not less than 25 per cent nor more than 40 per cent shall be paid from levy upon the taxable property of the township within which the improvement is to be made; and the balance, which shall not be less than 20 per cent nor more than 35 per cent shall be collected from the owners of real estate lying within one mile of the road to be improved. When any part of the improvement is in more than one county or on county lines the expense shall be divided between the counties in the proportion the distance in such county bears to the whole distance improved.

If there are not sufficient funds available the county commissioners are authorized to levy a tax not exceeding in any year 1 mill upon each dollar of value, in addition to all other levies authorized be law. The commissioners are authorized to levy upon any township in which such improvement is situated a tax not exceeding 10 mills in any year in addition to all other levies authorized by law. The county commissioners are authorized to sell the bonds of the county to any amount not exceeding the amount necessary to pay the respective shares of the county, township and land owners, the bonds to bear interest not to exceed 5 per cent per annum and to mature in not more than five years after they are issued.

Such highways shall be kept in repair by the county commissioners.

OKLAHOMA

Constitutional.—The legislature is directed to establish a department of highways and shall have power to create improvement districts and provide for building and maintaining public roads and may provide for the utilization of convict and punitive labor thereon.

State Highway Department.—A State highway department is created and established and the governor shall appoint a State highway commissioner for four years. The commissioner shall be a person of recognized knowledge in the construction and maintenance of improved roads, shall receive a salary of $2500 and actual traveling expenses not to exceed $1500 a year, shall take the prescribed oath of office and give a bond to the State in the sum of $500 for the faithful performance of the duties. A vacancy in the said office shall be filled in like manner as the original appointment.

All section lines in the State of Oklahoma are declared public highways. The public highways shall not be less than 33 feet nor more than 66 feet in width, the width to be determined by the county commissioners when established.

The commissioner shall keep a record of all the proceedings of the State highway department, shall employ an assistant engineer, or engineers, and such clerical force as may be necessary to conduct his department, at an annual expense not to exceed $5000. He shall prepare standard specifications for construction and maintenance of roads, and exercise authority in all matters relating to plans for the building and maintenance of improved public highways. He shall cause to be made and kept a general highway plan of the State and shall collect information relative to mileage, character, construction and condition of the highways throughout the State and all other matters of interest in connection with the highway work of the State.

All local road officials are required to furnish the State highway commissioner with any information which he may require, concerning the cost of building and maintaining the highways in their jurisdiction.

The State highway commissioner may, with the approval of the State board of affairs, purchase for the State all necessary equipment that may be needed for the purposes of his office.

Automobile Licenses.—A State license of $1 shall be charged annually to the owner of each automobile, and be collected by the State highway commissioner and shall be used for the payment of the salary of the highway commissioner and the expenses of said office. Any surplus shall be paid into the State treasury. Nonresidents, operating automobiles within the State, shall be required to pay the same license as provided for residents.

Nothing herein shall be construed as limiting the State's power to construct and build State highways and pay all costs of constructing and maintaining same, under direction of the State highway commissioner.

The township boards of supervisors shall have power to open and establish public roads on section lines only in their township where the right of way can be obtained by amicable settlement; the county commissioners shall have power to open and establish public roads on section lines anywhere in the county and obtain the right of way thereof, either by amicable settlement or condemnation. When there is public necessity therefor the county commissioners shall, upon the petition of the township board or of the resident free-holders of the township, open and establish any public road in such township along the most practicable lines. The township board of each municipal township are made highway commissioners for such townships and shall have supervision of the highways. Each member of said board shall receive $2 per day for each day actually engaged in working, not to exceed ten days in any one year, which shall be paid from the township road and bridge fund.

Said highway commissioners shall divide their township into districts of not less than 4 square miles each, and shall each year appoint one road supervisor for each district. Each supervisor shall be a resident taxpayer of the district from which he is appointed and shall receive $2 per day compensation for his services, not exceeding forty days in any one year.

Taxation.—Every male citizen, between the age of twenty-one and fifty years, having resided in the State thirty days, except such as are exempt by law, shall be subject to road duty of four days of eight hours each year, or furnish a substitute, or pay $1.25 for each day so required of him.

The county commissioners shall require the supervisor of any road district to work out upon the highways of any road district 50 per cent of the road duty therein, before the first day of July each year, and the remaining 50 per cent before the first day of January following.

The township board of any township shall levy a general road and bridge tax within their respective townships not to exceed 5 mills on the dollar, the proceeds of which shall be credited to the township and expended under the direction of the county commissioners.

Contracts.—The board of highway commissioners in any township, may let any piece of road or bridge work to contract to the lowest responsible bidder, after due advertisement for bids for same.

County Highway Engineer.—The board of commissioners of each county is empowered to appoint a highway engineer, at its meeting on January 1. Where competent and not otherwise incapable of performing the duties of county engineer, the person appointed shall be the county surveyor. Bond is required of the said engineer before entering upon his duties and his compensation is limited to not exceed $5 per day for time actually employed.

Said county highway engineer shall be a resident of the county and shall have a practical knowledge of civil engineering. He shall, when requested by the county commissioners, or the highway commissioners, or road supervisors within his respective county, give such instruction and advice with reference to the construction, building or repair of any roads and bridges therein and shall perform such other details, as may be required of him by said authorities.

Convict Labor.—The commissioners of any county may purchase such equipment as may be necessary for the employment of convicts or other labor upon the public roads. They shall have authority to work all convicts confined in the county jail upon the public highways in such county and employ such guards as may be required.

Any person working upon the public roads in lieu of payment of fine and costs shall be allowed a credit of $1 per day on such fine and costs. Said county commissioners have authority to receive, by agreement of the city council, the prisoners of any city who have been sentenced to the city prison, provided the commissioners shall not pay for the services of such prisoners except for the cost of their maintenance. Said county commissioners shall purchase necessary supplies, etc., for maintaining such convicts, said purchases to be made from the lowest and best bidder after reasonable public notice.

The State board of prison control is authorized to provide transportation and all necessary equipment for working convicts on the public roads of the State; provided said convicts shall be equally distributed, as near as practicable, among supreme court judicial districts of the State and worked among the various counties therein. Said work shall be performed upon such roads as are designated by the county commissioners of the county in which the work is done and the work shall be done in such manner as may be determined by the said board, provided that the county shall bear all expenses of the cost of material for road improvement therein.

The State convicts assigned to work upon such roads shall be divided into groups not exceeding 100 men in each group, and only one group shall be worked in one county at the same time and no group shall be allowed to work in any one county for a longer period than five months in any one year, nor shall any two groups be worked in any county until all the counties, making application for the same, shall have received their proportion of work from said convicts.

Bond Issues.—The township board of any township may issue bonds, in an amount not exceeding 3 per cent of the taxable property of said township, upon a favorable three-fifths vote for same, at an election held for that purpose. Said bonds shall bear interest at the rate of 6 per cent and run not exceeding twenty-five years.

Bridge Bonds.—The commissioners of any county are authorized, upon a three-fifths favorable vote at an election held for that purpose, to issue bonds of such county for the purpose of building, constructing, repairing and acquiring bridges; such bonds to run not exceeding twenty-five years and to bear interest not exceeding 5 per cent per annum.

Toll Bridges.—Provision is made whereby the county commissioners may buy toll bridges erected over public highways in the State.

Road Improvement Districts and Bond Issues.—Road improvement districts not less than 18 square miles in area, may be created in any county, upon petition by 15 per cent of the qualified electors of the district, filed with the clerk of such county. Such petition shall state the metes and bounds of the proposed district, the highways or highway to be improved and the general character of the improvements to be made and ask that a vote be taken on issuing bonds. The county commissioners shall appoint a time for consideration of the same. The board shall investigate the petition and, if found to comply with the law, then an order shall be entered establishing such district and fixing the amount of bonds to be issued, which shall in no case exceed 5 per cent of the valuation of the taxable property in such district, and shall order an election therein to determine the question of issuing bonds.

At such election every qualified elector within such road improvement district shall be entitled to vote and three-fifths of all the votes cast are required before bonds shall be issued. Such bonds shall bear interest at 5 per cent and run for not exceeding twenty-five years. In case bonds are issued it shall be the duty of the county commissioners to levy annually a tax sufficient to pay the interest and create a sinking fund for the redemption of said bonds.

After bonds shall be issued the county commissioners shall have charge of the improvements to be made therewith, and shall let the same to contract to the lowest and best bidder, after due advertisement, having the right to reject any and all bids, and the board has power to do everything necessary to properly execute said improvements.

OREGON

Constitutional.—No county shall create any debts or liabilities which shall singly or in the aggregate exceed the sum of $5000, except to suppress insurrection or repel invasion, or to build permanent roads in the county, but debts for permanent roads shall be incurred only on the approval of a majority of those voting on the question.

Statutory.—It shall be the duty of the secretary of State to cause a complete copy of the road laws of the State to be printed, and revise same after the termination of each session of the legislature.

Administration.—All county roads shall be under the supervision of the county court. All county roads shall be 60 feet wide, unless the county court shall, upon petition therefor, determine upon a different width, not less than 40 nor more than 80 feet. The county courts of the several counties shall, not oftener than once each year, divide their respective counties, or any part thereof, into road districts and annually appoint a road supervisor for each district, who shall receive a compensation of $2.50 per day and shall have general supervision over the roads in his district, subject to the county court. The commissioners or court of each county may each year appoint a road master, or masters, who shall be paid a salary sufficient to justify the employment of a competent person, who can devote his entire time to the work, and he shall have general supervision over the roads of the county.

Taxation.—The county court of each county may levy a tax, not to exceed 10 mills on the dollar, each year at the time of making the regular annual tax levy, which shall be set apart as a general road fund. The tax-payers of any road district in any county may vote an additional tax, for road purposes, at an election to be held for that purpose, and in such amount as may be determined upon.

Contracts.—The county court and the road master may execute work upon the highways by letting the same to contract, or by force account under the county road master.

Automobiles.—A license of $2 is imposed upon motor vehicles and a chauffer's license of $2 is also imposed. Application for each shall be to the secretary of State. Non-residents, who have complied with the registration laws of their State, are exempt for a period of thirty days from procuring a license in Oregon. All the moneys collected pursuant to such registration and license, and fines and penalties for violations, shall be paid to the treasurer of the county in which the same is collected and applied to the general road fund of the county.

At the general election on November 5, 1912, the people ratified the following acts of the legislature:

Convict Labor.—An act prohibiting the employment of convicts of the State penitentiary by any private person, firm or corporation and authorizing their use on public highways and State institutions on the request of the county court or superintendent of the State institution desiring to employ them.

An act prohibiting the employment of county, city or town convicts by any private firm, person or corporation and providing for their employment on public highways and other works of a public nature and authorizing county courts to prescribe rules and regulations in regard to such employment.

Financial.—For amendment of Section 7, Article XI, of the Oregon Constitution prohibiting the State from increasing its indebtedness for road building in excess of 2 per cent of the taxable property of the State.

For amendment of Section 10, Article XI, of the Constitution of Oregon prohibiting counties from voting any indebtedness for roads, in excess of 2 per cent of assessed valuation of all property in the county.

Toll Roads.—Provision is made whereby county courts, in sparsely settled communities may lease such roads to any person or corporation to keep the same in repair, for not exceeding ten years, and in consideration thereof collect and receive tolls for travel thereon.

PENNSYLVANIA

State Highway Officials and Their Duties.—The governor appoints a State highway commissioner for four years who gives his entire time to the office. He receives $8000 per annum, and furnishes a bond of $50,000. The governor also appoints two deputy State highway commissioners, to be known as first and second deputy State highway commissioners, respectively; one of whom must be a competent civil engineer. They each receive $6000 per annum, and each gives bond of $25,000. The governor shall also appoint an auditor of the department who must be a certified public accountant. He receives $3000 per annum and gives bond of $25,000. The auditor audits all accounts of the department and countersigns all warrants.

The governor appoints a chief engineer, who must be a capable and competent civil engineer, who is paid $7000 per annum. The State highway commissioner appoints as an assistant to the chief engineer, an engineer of bridges, who must be a capable and competent civil engineer, experienced in the designing and construction of bridges, who is paid $3600 per annum. He shall also appoint fifty superintendents, experienced in the construction and maintenance of improved roads, known as superintendents of highways; he may also appoint fifteen competent civil engineers, a chief draughtsman, four assistant draughtsmen, a chief clerk, four additional clerks and four competent stenographers, and from time to time, such additional stenographers and clerks as the work of the department requires; he may also appoint two competent book-keepers. The State highway commissioner, his deputies and other officers shall be paid their traveling expenses.

The State highway commissioner is empowered to make rules for conducting the business of the department and to prescribe the duties of all appointees and employees. He is authorized to purchase all machinery, tools and materials of any kind necessary in the construction and maintenance of the highways.

The State highway commissioner shall give notice in writing to the proper township or county officers of his intention to take over any highway and of the date when the State highway department will assume the maintenance and care thereof.

All existing public roads, highways, turnpike and toll roads forming main traveled routes between county seats and main traveled roads or routes leading to the State line, and between principal cities, boroughs and towns shall be built, repaired and maintained at the sole expense of the commonwealth; and shall be under the exclusive authority and jurisdiction of the State highway department, and shall constitute a system of State highways.

The State highway commissioner shall file for public use in the department, maps of the State highways, and where the expense of constructing a route as at present defined may be materially lessened by a divergence from the route, the commissioner is empowered, with the approval of the governor, to divert the direction of same to correct any inconvenience to the traveling public or lessen the cost to the commonwealth.

Where a turnpike or toll road company shall control any part of a route forming a State highway, it shall be the duty of the State highway commissioner to purchase said turnpike or toll road, and if a fair and reasonable price, which shall be approved by the governor, cannot be agreed upon, the State highway commissioner shall then petition the court of quarter sessions of the county in which the State highway is located and said court shall appoint a jury to view said turnpike, toll road or highway and appraise the damages which the owner shall be entitled to receive therefor. If the damages finally awarded shall be deemed excessive by the State highway commissioner, he may refuse to accept the appraisement and may then omit such turnpike or toll road from said route of State highway, in which case all court costs shall be paid by the State highway department; and he may select the next best route to connect up a continuous State highway.

Any apportionment of the State into highway districts shall not include or in any manner interfere with the roads, streets and highways in any of the cities, boroughs, or incorporated towns of the commonwealth; the maintenance of such roads heretofore improved or reconstructed, which form a part of a State highway, shall be done by the State highway department, the respective borough or incorporated town in which said work is done to pay 50 per cent of the cost of maintenance, except that where any road, street or highway in any borough or incorporated town has been heretofore constructed as a State aid road with bricks, or material other than a telford, water bound macadam road, or which may hereafter be constructed as a State highway, said road shall be maintained according to the standards of the State highway department wholly at the cost and expense of the borough or incorporated town in which said road, street or highway may lie.

The State highway commissioner is directed to construct or improve, and thereafter maintain and repair, at the cost and expense of the commonwealth, the highways forming the plan or system of State highways in the several counties and townships, specifications for which are to be prepared by the State highway department, the expense for which is to be paid out of moneys specifically appropriated for the purpose.

The State highway commissioner may enter into a contract with any person, or the authorities of any borough or incorporated town, or the commissioners of any county, or the supervisors or commissioners of any township, to repair and maintain any highway designated as a State highway. Contracts shall be awarded to the lowest responsible bidder, bond to be furnished by the contractor in a sum equal to 50 per cent of the contract price.

The State highway department shall advertise for proposals for construction, at least three weeks before the contract may be awarded, by public notices inserted once a week in at least two newspapers in the county or counties in which the highway to be improved is located, and may also insert the same advertisement in other newspapers or engineering periodicals. All contracts shall first be approved by the governor, signed by the State highway commissioner, and approved as to form and legality by the attorney-general or deputy attorney-general.

All State highways shall be marked with suitable signs, having the words "State highway" and date thereon. The State highway commissioner may also cause trees to be planted along the highways. No railroad or street railway shall be constructed upon any State highway except under conditions prescribed by the State highway department.

The manner and method of construction of all State highways to be improved or rebuilt shall be decided by the State highway commissioner before the contract is let; all State highways to be constructed and improved to a width of not less than 12 feet.

The State highway commissioner shall cause to be made a survey of all the roads of the State; and shall cause to be made and kept for the State highway department a general highway plan of the State; and compile statistics and collect information relative to the mileage, character and condition of the highways in the townships and counties. He may be consulted at all reasonable times by county, city, borough, incorporated town or township officers having authority over highways and bridges. He shall prepare and compile all useful information relative to road building and maintenance, which he shall disseminate by bulletins. He shall cause to be published maps showing complete road surveys of each county, which shall be kept on sale in the State highway department, at cost of publication.

Apportionment of Road Revenues.—Counties and townships desiring State aid shall be entitled to receive the aid and coöperation of the State, upon the payment of 25 per cent of the cost by county and township when the application is made jointly, the State paying 50 per cent of the cost, the township thereafter to pay 50 per cent of the entire cost of maintenance. Where a county or township desires improvement without the joint action or coöperation of the other, then said township or county shall pay 50 per cent of the cost and 50 per cent of the cost of maintenance thereafter. Any township desiring the aid and coöperation of the State in the permanent improvement of any of its roads shall levy a cash road tax to meet the cost thereof and shall levy annually thereafter such further road taxes in cash as are sufficient to pay the township's share of the annual maintenance of such highways.

The State shall not furnish aid for the improvement of a State aid highway until the supervisors or commissioners of the township in which the road desired to be improved lies, where the improvement is intended to be made jointly by township and county, shall first petition the county commissioners; and it shall then be the duty of the county commissioners to adopt a resolution authorizing the assumption by the county of its share of said improvement, the county commissioners to then petition the State highway department for the aid desired.

Where the owners of the majority of the assessed valuation of real estate desire any principal road lying in their township to be improved as a State aid highway, they may petition the supervisors or commissioners of their township and require them to petition the county commissioners to make application to the State highway department for said improvement and maintenance.

In case of refusal or delay by county commissioners to township supervisors to act upon any petition for the improvement and maintenance of any highway as a State aid highway, any citizen, taxpayer of the township or county may present the facts of the matter to the court of quarter sessions, and, after due hearing by said court, the court shall make an order directing the township supervisors or commissioners or county commissioners to act upon said application for State aid and that the said application be forwarded to the State highway department.

The State aid fund appropriated shall be ratably apportioned among the several counties according to the mileage of township and county roads in the respective counties. No section of State aid highway shall be less than one-half mile in length.

The word "highway" shall be construed to include any existing causeway or bridge, or any new causeway or bridge, or any drain or watercourse, which may form part of a road, and which has been or might properly be built by the townships of the commonwealth. A "State aid highway" shall be construed to mean only such highway as is improved with the aid and coöperation of the State with county and township, or with county or township, borough or incorporated town, either or severally, but shall not include any causeway or bridge which should properly be built by the county or by the State.

Appropriations.—The sum of $3,000,000 is appropriated for the purpose of maintenance, repair and construction of the State highways and for the payment of the State's share of the maintenance and repair of State aid highways heretofore constructed; the sum of $1,000,000 is appropriated for the purpose of State aid in the permanent improvement of the highways described as State aid highways. All moneys appropriated shall remain for the use of the Department until the same is entirely used and applied to the purposes for which it was appropriated.

Local Road Legislation.—General jurisdiction over the roads in each county vests in the county board of commissioners.

In each township three township supervisors of roads shall be elected, one annually. Said township supervisors shall divide the township into road districts and employ a road master for each district.

The county commissioners may levy a tax not to exceed 2 mills on the dollar upon all property to improve important county roads.

The township supervisors may levy a road tax not exceeding 10 mills on the dollar of all property therein. An additional levy of 10 mills on the dollar may be made by order of the court of quarter sessions.

County road and bridge bonds may be issued in an amount not exceeding one-half of 1 per cent of the total assessed valuation of property in the county, provided that not more than one-tenth of 1 per cent of such taxable valuation shall be issued in bonds in any one year.

In 1909 a law was passed providing that all road taxes should be paid in cash, except in townships which, by the majority vote at their annual meeting, shall adopt the system of working out road taxes upon the public highways.

RHODE ISLAND

State Highway Officials.—The State board of public roads consists of five persons, one from each county, appointed by the governor, for five years. They may be removed by the governor for a cause with the consent of the senate. The members of the board receive $1000 each per annum.

Duties of State Highway Officials.—The State board of public roads is authorized to expend $5000 annually for clerical hire, engineers, assistants and incidental expenses. They are required to annually make a report accompanied by maps showing present location and grades, proposed location and grades, proposed improvement and probable cost.

The board has direct control of the expenditure of all appropriations by the legislature for road improvement; is authorized to make all contracts, the work done under such contracts to be subject to the approval of the board and in accordance with its plans and specifications. The board reserves to itself the right to reject any bids. The successful bidder shall give bond in sum of not less than 50 per cent of the contract price. Such contracts shall contain forfeiture clauses. The board has supervision over the maintenance of all State roads, and authority to remove any buildings or fences or other obstructions encroaching upon any State road.

Duties of Local Officials.—Any town or city desiring to have a greater width of State highway than 14 feet, exclusive of shoulders or gutters, may agree with the State board of public roads for additional width the cost to be paid by such city or town to the general treasurer. Any town or city having the use of adequate road machinery may bid for contracts and shall have preference over the proposal of any other person for such portion of the main highway as may be within the limits of such town or city, provided their bid does not exceed the lowest bid made by any competitor. Every town or city shall keep such State roads within its limits sufficiently clear of snow and ice to render them safe for traveling and shall notify the State board of any defect or want of repair of such roads.

State Aid to Towns.—Each town shall annually appropriate such sum as the electors thereof shall vote necessary for the maintenance of its highways and bridges. Whenever any town shall make such annual appropriation equal to or in addition to the sum of 20 cents on every $100 of ratable property and whenever the electors shall vote that said appropriation be expended under the direction of the said board of public roads such town shall be entitled to State aid in the care and maintenance of its public highways and bridges other than State highways as follows: A sum of money equal to one-fifth of the money appropriated, as aforesaid, by any town is annually appropriated by the State for the care and maintenance of the public highways and bridges of said towns.

State Road Revenues and Their Distribution.—The cost of all construction and maintenance of State highways is paid by the State. The general treasurer of the State was authorized in 1906 to issue State bonds in the amount of $600,000 for highway purposes, to bear 3 per cent interest. Another bond issue of $600,000 was authorized in 1909, the proceeds to be used in completing the system of State roads under the direction of the State board of public roads. Another issue was authorized in 1911 for the same purpose.

Not more than one-third nor less than one-seventh of the net available appropriation for road improvement in any one year shall be expended in any one county, unless otherwise especially ordered by the general assembly at the time of making the appropriation. The proceeds of automobile licenses and registry fees and fines are used for the repair of State highways under the direction of the State board of public roads, except the specified amount which is allowed to the board for clerical and other expenses incident to carrying out the provisions of this act.

Automobile Legislation.—Every owner of one or more motor vehicles shall file in the office of State board of public roads a statement of his name, residence, post office address, a brief description of each motor vehicle owned by him, and such other information as the board may require. The board shall determine the horse-power of each vehicle and the following fees shall be paid to the board for the certificate and license issued by it: for registration of every motor cycle, $1; commercial motor vehicle and each motor truck, $2; every automobile of 20-horse power or less, $5; every automobile over 20-horse power and not over 30-horse power, $10; every automobile over 30-horse power and not over 40-horse power, $15; every automobile over 40-horse power, $25; for the registration of all motor vehicles owned or controlled by manufacturer or dealer, $50; for each original license or duplicate to operate motor cycle, $1; for substitution of registration of a motor vehicle previously registered, $1.

Local Administration.—There is no county law in regard to county highways.

The town highways are taken care of by the town officials, some are elected by the people and others appointed by the town councils of the several towns. The money is appropriated in open meeting of the taxpayers held annually.

Bridges.—The general assembly enacted legislation in 1912 providing that bridges on State roads shall be under the supervision of the State board of public roads and that said board shall examine the bridges and superintend necessary construction and reconstruction, the expense to be paid in the first instance by the State. Upon the completion of such work the State board is required to file detailed statement of the amount expended therefor with the clerk of the town or city in which the bridge is located, and if the bridge is used by a public utility copy of such statement shall be filed in the office of such public utility and with the public utilities commission, which commission shall after hearing determine the portion, if any, of the expense to be borne by said public utility. The State board of public roads shall determine what part of the expense shall be paid by the town or city, but the amount shall in no event exceed one-half of the total expense. If the bridge lies between two or more towns or cities the portion of expense to be paid by each shall be determined by the State board. The State board shall file with the town or city clerk a statement of the total expense of the bridge and the portion to be paid by the town or city.

The sum of $200,000 was appropriated for the construction and reconstruction of said bridges, and the act provided that all amounts of money repaid by towns or cities shall be retained as a separate fund for construction and reconstruction of bridges. Such bridges shall become part of the State highway system. The board is authorized to recommend bridges for construction and reconstruction in their annual reports.

The towns or cities in which the bridges are located are required to keep such bridges clear of snow or ice, and the State board of public roads is required to maintain such bridges.

The word "bridge" under this act refers to structures not less than 5 feet in width.

SOUTH CAROLINA

Constitutional.—The general assembly shall not have power to authorize any county or township to levy a tax or issue bonds for any purpose except educational, to build and repair public roads, buildings and bridges, and to maintain and support prisoners.

Statutory.—All roads, highways and ferries laid out or opened by an act of the general assembly, or an order of court, or an order of the county board of commissioners, are declared public roads and ferries, to be under the supervision and control of the county board of commissioners and the county supervisor, except in the counties of Bamberg, Bornwell, Beaufort, Charleston, Cherokee, Chester, Hampton and Kershaw. In the eight counties named the township board of commissioners in each township, together with the county supervisor, shall have supervision and control over the public roads.

Each township in the counties not under township organization, except where special legislation provides otherwise, shall constitute a highway district and the supervisor and county board of commissioners shall divide the highways in each district into sections of two to five miles each, and appoint an overseer for each section. In the counties having township organization the township boards of commissioners, subject to the approval of the county board of commissioners or the supervisors of the county, shall divide their respective districts into suitable road districts and appoint an overseer for each.

Taxation.—The commissioners of any county may levy a road tax, not to exceed 1 mill on the dollar when so requested by written petition signed by two-thirds of the free-holders of such township. Such tax to be collected as other taxes and expended on the highways of such townships.

All male persons able to perform road labor, between the ages of eighteen and fifty years, except those exempt by law and except as varied for certain counties, are required annually to perform or cause to be performed labor on the highways under the direction of the overseer, from two to eight days of ten hours each, as required by the authorities of the respective counties. In lieu of performing such labor upon the public highways a commutation tax of $1 to $3 according to the county, may be paid. The commutation tax so collected must be expended by the county commissioners upon the public roads in the township from which collected.

The board of assessors of any township are authorized to levy an annual road tax, to supplement any other funds for like purposes, upon the petition of at least one-fourth of the resident electors of the township and a like proportion of the resident free-holders of the age of twenty-one years being filed with the county commissioners, asking for the same, and stating the rate of tax levy proposed, not exceeding 2 mills; said county commissioners shall then order the township board of assessors to hold an election to ascertain the sense of the voters on the question. If a majority of those voting shall vote for such levy the same shall be made.

Width of Roads.—The road beds of all roads heretofore or hereafter laid out shall be not less than 16 feet nor more than 20 feet wide, exclusive of side ditches, ruts and other obstructions, unless otherwise ordered by the county commissioners.

Tires of Vehicles.—All vehicles the tires of which are more than 4 inches broad shall be subject to a toll on all turnpike roads in the State less by 25 per cent than by same vehicles having narrow tires, and vehicles having tires more than 6 inches broad shall be subject to a toll on such roads less by 50 per cent than by vehicles of the same description having tires less than 4 inches. The maximum of tolls established by any law granting charter to turnpike roads shall only have reference to vehicles with tires less than 4 inches broad.

Toll Roads.—At every 20 miles of turnpike road completed one toll gate may be established with the rates of toll fixed by law, or for every 10 miles of turnpike road completed with one-half the said rates of toll.

Toll bridges, turnpikes and ferries are chartered by the legislature or the board of county commissioners in the county where located.

Convict Labor.—All able-bodied male convicts shall hereafter be sentenced to hard labor on the public works of the county in which convicted, if such county maintains a chain gang, without regard to length of sentence, and in the alternative to employment in the county jail or State penitentiary at hard labor, provided that in any case the presiding judge shall have power to direct that any person convicted before him be confined in the State penitentiary if it is considered unsafe or unwise for such convict to be committed to the county chain gang; provided, that a separation of the sexes and races be at all times observed, except in the penitentiary and on the State farms, and provided further, should the supervisor or commissioners of any county find that it is inconvenient or impracticable to work any convict committed to the county chain gang he may turn said convict over to the penitentiary authorities.

SOUTH DAKOTA

Constitutional.—For the purpose of defraying extraordinary expenses and making public improvements or to meet casual deficits or failure in revenue, the State may contract debts, never to exceed in the aggregate at any one time $100,000 except to repel invasion, etc.

The debt of any county, city, town, school district, civil township or other subdivision shall never exceed 5 per cent on the assessed valuation of taxable property therein.

Local Administration.—General authority over highways, in counties organized into townships, vests in the township board of supervisors. All construction work, which in any one place or continuous stretch of road shall require an expenditure of less than $500 shall be done by the township in which such road is situated, under the supervision of the supervisor thereof, said supervisor to advertise for bids and let the same to contract. All road construction, which is in one place or continuous stretch, including bridge approaches and grading same, which shall cost $500 or more, including surveying fees, shall be done by the county under the supervision of the county commissioners, by letting same to contract after due advertisement. The county commissioners in counties of considerable area, which are mountainous, shall employ a practical engineer to superintend the road work of the county and fix his salary.

In counties having unorganized townships all the road work of said unorganized townships shall be under the control of the county commissioners.

Taxation.—Every male resident, over twenty-one and under fifty years of age, except such as are exempt by law, shall be assessed $2 each year for road and poll tax purposes. The township supervisors shall proceed to assess such taxes upon real and personal property by law and such taxes, when collected, shall constitute a road fund belonging to the township from which collected. All assessments upon persons and property shall be paid in cash, provided that the electors may by a majority vote decide to allow such taxes to be paid in labor at the rate of 20 cents per hour, or 40 cents per hour for man and team.

On the first Tuesday in September the county commissioners shall levy a road tax, in addition to road taxes levied by the several townships in their counties, which may not exceed 5 mills on the dollar of assessed valuation and they shall have entire supervision of the expenditure of said taxes and, as far as equitable, shall expend said fund for the benefit of the people of the township from which said tax is received; provided they may levy a higher rate, not to exceed 10 mills on the dollar, if they have been directed to do so by a majority of the electors. Upon petition of 10 per cent of the electors of the county, the county commissioners shall order an election upon the question of levying a greater amount of road taxes than 5 mills for the next fiscal year or a term of years, not exceeding three, to be voted on at the next general election.

In counties having unorganized townships the county board of commissioners is empowered to levy not to exceed 8 mills on the dollar for any one year, for a road fund, provided said road fund shall be expended in such unorganized district.

Where State lands abut or adjoin a highway which leads directly to markets and where townships or counties have improved the highway to the said State lands, the State commissioner of schools and public lands and the State engineer are authorized to contract with responsible parties for the purpose of continuing said improved highways as far as the State lands are abutting or adjoining on the same and the State shall pay its portion of said road improvements. Said road work shall be under supervision of the State engineer. On completion of the work by the contractor and the approval of the State engineer the said State engineer may issue a voucher for the amount of the contract and the State auditor shall issue a warrant for the same to the contractor, on the general funds of the State.

TENNESSEE

Administration.—Jurisdiction over roads vests in the county court. It is the duty of each county court, at each odd year, to divide the county into road districts and elect a road commissioner for each district, to have general supervision over the highways therein.

The county court of each county may elect a board of turnpike commissioners every four years, composed of three persons. The chairman of said court shall be ex officio chairman, the other two persons being free-holders of the county, not members of said court. It shall be the duty of said commissioners to look after all turnpikes and toll roads in the county, keep the same in repair, fix the rates of toll, and annually make report to county court.

The road commissioner of each district shall appoint, for a term of one year, an overseer for each section of road, as established by the county court.

Taxation.—All male residents of the county, between the ages of eighteen and fifty years, except those exempt by law, are subject to road duty. The number of days duty for which each is so liable to be determined by the county court in each county, but not less than four nor more than eight days shall be required. Said road duty may be discharged by furnishing an able-bodied substitute or by paying 75 cents per day for each day so required.

The county courts shall levy each year for road purposes on all property in their respective counties, outside incorporated towns and cities, 2 cents on each $100 valuation for each day assessed to labor on the public roads, provided any person may work out two-thirds of this tax on the public roads in the district wherein said property is situated. Two-thirds of the proceeds of this assessment from any given district shall be expended on the roads therein, under the supervision of the district road commissioners.

Not less than one-fourth of the assessment for county purposes shall be set aside for road purposes and be apportioned equally according to road mileage in the several districts. The county courts shall levy, each year for road purposes, tax on all property in their respective counties outside incorporated towns and cities and tax districts, of not less than 10 nor more than 30 cents to each $100.

Convict Labor.—County convicts may be worked upon the public highways of the county, subject to the direction of the county court.

Bond Issues.—County bonds, in each particular case, are issued after passage of a special act by the legislature and a vote had thereon by the people.

Bridges.—The county court shall have power to appropriate money for building bridges. Bridges that cannot be built by the overseer and his assistants shall be a county charge and the county court shall make a levy to raise money for that purpose; said levy not to exceed in any year 20 cents on the $100. If the county court thinks best the question of constructing such bridge, where the cost is great, may submit the proposition to a vote of the people.

Local organizations have supervision of roads and ferries in different counties, as many counties are operating under special laws.

TEXAS

Constitutional.—The State tax on property, exclusive of the tax necessary to pay the public debt and of the taxes provided for the benefit of free schools, shall never exceed 35 cents on the $100, and no county, city or town shall levy more than 25 cents for county or city purposes and not to exceed 15 cents for roads and bridges on $100. Other levies are allowed for public buildings, streets, sewers, water-works and other permanent improvements. The legislature may also authorize an additional tax for the maintenance of the public roads, on the favorable vote of a majority of the qualified property taxpaying voters of the county, such additional tax not to exceed 15 cents on the $100 valuation.

The legislature shall make provisions for laying out and working public roads, for the building of bridges and for utilizing fines, forfeitures and convict labor for all these purposes.

The legislature shall make provisions whereby persons convicted of misdemeanor and committed to the county jails in default of payment of fines and costs, shall be required to discharge such fines and costs by manual labor, under such regulations as may be prescribed by law.

The commissioners court of any county is authorized to issue bonds, or otherwise lend the credit of a county or any political subdivision, or defined district thereof, to an amount not to exceed one-fourth of the assessed real estate values for constructing and maintaining gravel, paved, or turnpike roads; provided such bond issue shall be approved by a two-thirds majority of the qualified property taxpaying voters of said county or subdivision.

Statutory.—The commissioners court shall classify all public roads in their county into first, second and third class roads, shall act as supervisors of roads in their respective precincts and may open new roads or straighten existing ones.

The commissioners court shall have full power and authority and may adopt such systems for working, laying out and draining the public roads as may seem best. Each road commissioner shall have control over all road overseers in his precinct.

The commissioners court of any county may appoint one road superintendent for such county or one superintendent for each commissioner precinct. Such superintendent shall be a qualified voter of the county or the precinct from which he is elected and shall hold office for two years.

The road superintendent, subject to the commissioners court, shall have general supervision over all public roads in his county or precinct and over all county convicts working on the roads.

Each such superintendent shall receive such salary as the court may fix, not exceeding $1000 a year in counties of less than 15,000 inhabitants, nor $1200 in counties of more than 15,000 inhabitants. In case precinct superintendents are appointed, each shall receive not exceeding $300 per year in counties of less than 15,000 inhabitants and not exceeding $400 in counties of more than 15,000 inhabitants.

The commissioners courts shall lay off their respective counties into convenient precincts and shall number each precinct and specify the boundaries thereof.

At the first regular term of each year the county commissioners court can appoint a road overseer for each road precinct in the county and shall, at the same time, designate all hands liable to road work and apportion them to the several overseers.

Taxation.—All male persons between the ages of twenty-one and forty-five, not exempt by law, are liable to work on the public roads not more than five days each year, or commute the same at the rate of $1 per day.

Upon presentation to the commissioners court of any county of a petition signed by 200 qualified voters, who are property taxpayers in the county, requesting that an election be ordered to determine whether there shall be levied upon the property of said county, by said commissioners court, a road tax not to exceed 15 cents on the $100 worth of property, said court shall order said election and if a majority of the votes cast are in favor of such tax the same shall be levied by the said commissioners court.

Any county or defined district of a county, upon a vote of two-thirds majority of the resident property taxpayers voting thereon, who are qualified electors of such county, may issue bonds or other-, wise lend its credit in an amount not to exceed one-fourth of the assessed valuation of real property in such county or district thereof and to levy taxes to pay the interest on said bonds and create a sinking fund for their redemption for the purposes of constructing and maintaining macadamized, gravel and paved roads and turnpikes or in aid thereof.

Each defined district so issuing bonds may sue and be sued in like manner as counties.

The county commissioner in whose precinct such defined district may be located shall be ex officio road superintendent of the road district, with power to contract for same up to $50 only. Beyond that amount, contracts are let by the whole court.

Ferries and Toll Bridges.—The commissioners court may contract for the building of toll bridges, fixing the tolls to be charged and taking security from the contractor to keep the bridges in repair. The said court may also license ferries and may assess an annual tax of not exceeding $100 for the privilege of each and every ferry in the county.

Convict Labor.—The commissioners court may require all male county convicts, not otherwise employed, to labor upon the public highways under such regulations as may be deemed most expedient. Each convict worked on the roads in satisfaction of any fine and cost shall receive a credit thereon of 50 cents for each day he may labor and reasonable commutation of time may be granted as a reward for faithful service and good behavior, provided same shall not exceed one-tenth of the whole time.

Bond issues.—The commissioners court of any county is authorized to issue bonds of said county for purchasing or constructing bridges for public purposes, within a county or across a stream that constitutes the boundary of a county or for the purpose of improving and maintaining the public roads in the county; provided a proposition for the issuance of such bonds shall have been first ratified by a vote of the qualified voters, who are property taxpayers of said county, or city.

UTAH

State Highway Officials.—There is a non-paid State road commission consisting of the governor, the State engineer, the State treasurer, one member of the faculty of the Utah Agricultural College, and one faculty member of the University of Utah.

Duties of State Highway Officials.—The State road commission shall select the roads which shall comprise the system of State roads; and shall prepare a map of the roads so designated; shall have charge of the expenditures of State road funds; shall furnish plans, specifications, etc., on application of county commissioners; shall prepare a road manual for the guidance of road officials, keep all records in the office of the State engineer for public inspection; and make a biennial report to the governor. The State road commission shall prepare all plans, specifications and estimates of State roads and may let the work to contract. Engineering machinery, apparatus and the force of the mechanics and instructors operating the same at the University and the Agricultural College of Utah shall assist the State road commission without compensation.

Duties of County Officials.—Each board of county commissioners shall biennially appoint a county road commissioner and fix his compensation, whose duty it shall be, among other things, to assist in constructing State roads under the direction of the State road commission. The county commissioners shall, upon application of the State road commission, prepare a map showing the location of all county roads and shall designate the most traveled ones. State roads in each county shall be kept in repair by the county. The duties of county commissioners in connection with the apportionment of State aid funds is explained in the paragraph "Road Revenues and their Distribution."

Road Revenues and Their Distribution.—Moneys received by the State from the United States on account of forest reserves shall be applied to the creation of a fund for the benefit of the public schools and public roads of the county or counties in which the said forest reserve is situated, the said fund to be annually apportioned among the said counties.

A State road fund is created by an appropriation from the general revenues of the State. The State road commission shall require counties of an assessed valuation under $2,000,000 to duplicate one-fourth of the amount of the State fund available to that county while counties having assessed valuation of $2,000,000 or more may be required to duplicate the full amount. County commissioners may, however, appropriate any additional sum that they may desire to use in connection with the State fund the same to be expended by the State road commission.

The county commissioners shall levy a special road tax on all taxable property in any precinct in which the State road commission shall decide to improve a road, said levy not to exceed 5 mills, except when authorized by a majority of property owners. This tax shall not be used in lieu of the amount to be appropriated by the county.

Any moneys which may become available from the National government or from gifts, bequests and donations to the State for road building purposes shall become part of the State road fund.

Automobile Licenses.—The proceeds of an automobile license fee of $2 and a license fee of $2 for chauffeurs, together with the fines for violations of the said law shall go into the State road fund.

Local Road Administration.—Board of county commissioners has control over public roads.

The board shall appoint a county road commissioner, who shall, under the direction of the board, have charge of the roads of the county, employ competent help, prepare plans, specifications and estimates and, after approval of same by board, shall have charge of construction. He may assist in construction of State roads under State road commission. He shall make annual written report to the board showing names of persons assessed for road poll tax in each precinct; amount of tax collected; amount of uncollected tax; amount expended in each precinct and description of improvements made; general description of condition of roads; time record of self and assistants.

Road Poll Tax.—Poll tax of $2 to be paid into county treasury and expended by county commissioners.

Convict Labor.—Jail prisoners may be used under regulations of county commissioners. Prisoners from State prison under less than ten years' sentence may be used under regulations of State board of corrections.

Taxation.—Outside of special road district taxes all county roads of the State are built and maintained from general fund of county. The special road district plan assesses adjacent property owners to one-third of distance from road to boundary of property benefited 50 per cent of cost of improvement; those in the middle third of distance 30 per cent of cost, and those in outer third 20 per cent of cost.

VERMONT

State Highway Officials.—The governor shall biennially appoint a State highway commissioner.

Duties of State Highway Commissioner.—The State highway commissioner shall control the expenditure of all moneys appropriated by the State, or apportioned to towns or incorporated villages for highway purposes; and shall annually make rules for governing such expenditures; and shall issue the same to the town road commissioners with plans, specifications and advice; and he shall also control the expenditure of all special appropriations made to the towns for highway purposes either by the general assembly or by order of the governor.

The State highway commissioner, with the advice and consent of the governor, shall annually appoint not to exceed one supervisor for each county to assist him in the performance of his duties therein. The selection of the roads by the selectmen and town commissioners for improvement as stated, shall be subject to the approval of the State highway commissioner. And no State money can be expended on any but these "selected highways." All money from the State for the improvement of any road shall be expended by a commissioner appointed by the selectmen with the consent of the State highway commissioner, but the selectmen and the State highway commissioner may agree upon any plan of expenditure deemed best in any such town.

The State highway commissioner shall meet the various road and street commissioners of the several towns and villages at least once annually at such time and place as he may direct. The said commissioners shall be entitled to their per diem and necessary expenses for attendance at such meetings. The State highway commissioner shall biennially report to the general assembly the condition of the highways in the State, progress being made on permanent improvements, and recommendations.

The maintenance fund derived from automobile registration shall be expended in the repair of main thoroughfares and State roads, under the direction of the State highway commissioner.

Duties of Local Officials.—The selectmen of each town shall select the main thoroughfares and most important roads for improvement, and shall submit such selection to the State highway commissioner for approval, but such roads, if approved by the State highway commissioner, shall be known as State roads. The towns shall keep such State roads in good repair at all seasons of the year. All money received from the State shall be expended by a commissioner appointed by the selectmen of each town with the consent of the State highway commissioner, unless the selectmen and State highway commissioner may agree upon some other plan. A report of such work upon forms furnished by the State highway commissioner shall be made in detail as he may require.

State Road Funds and their Distribution.—A State highway tax of 5 cents on $100 is annually assessed upon the grand list for the improvement of highways. The State treasurer shall apportion to the towns and unorganized towns such taxes according to their respective grand lists and annually transmit to each town treasurer and collector of taxes a notice of the amount so apportioned, and the amount must be paid to the State treasurer on or before June 10 following. The tax so raised shall be reapportioned to the several towns and incorporated villages upon the basis of the total road mileage therein, which shall be certified to the State treasurer by the selectmen. The State treasurer shall within twelve days after the receipt of the amount, apportion to each town and incorporated village its portion of such fund on the basis of the ratio of the highway mileage therein to the total road mileage of the State. The State treasurer shall annually on or before July 1 report to the State highway commissioner the amount apportioned to each town and incorporated village. Any unexpended balance of a State highway tax at the end of any year shall be carried over and reapportioned the following year.

An appropriation of $150,000 was made in 1910 for permanent road improvement under the provisions of this act, to be available to cities and towns, excluding incorporated villages, as follows: When a town shall vote to raise money in addition to the amount required by law, and shall notify the State highway commissioner on or before April 1 of each year of such action, the State highway commissioner shall apportion to the towns an amount equal to the excess amount so provided by the towns, provided the amount raised by the towns is not less than $100 or more than $750 in any one year. The act also provides that an incorporated village may, upon application to the State highway commissioner have the services of an expert for consultation under the following conditions: A village voting and expending $500 in any one year on permanent street improvements may have such services at an expense not to exceed $100 for the biennial term, and if $1000 is so voted they may have the services at an expense not to exceed $300 for the biennial term.

A town may, with the consent of the State highway commissioner, expend in the first year of a biennial term the full amount of its apportionment. If the selectmen of a town request that work be done by contract, the State highway commissioner may grant such request, if he deems it advisable, and in such cases he shall furnish plans and specifications, and all work shall be done to the satisfaction of the said commissioner.

Automobile Legislation.—Annual registration is required. An application for such registration shall be made to the secretary of State, and be accompanied by a fee of $1 for each horse power of such motor vehicle. The second registration fee shall be but 75 per cent of the first fee and the third and each successive registration fee shall be but 50 per cent of the first fee. Funds thus derived shall be applied to a separate fund to be called the "maintenance fund," to be expended in the repair and maintenance of main thoroughfares and State roads under the direction of the State highway commissioner in the various counties in proportion to the amounts received therefrom as nearly as possible. A resident of another State or country who has complied with the laws of his own State or country relating to automobiles, shall not be required to pay an automobile registration fee for operating an automobile in the State not to exceed ten days, provided that such State or country grants a like privilege to the residents of this State. If such person operates such machine in the State more than ten days but not exceeding sixty days, he shall pay a license fee of $3 for each motor vehicle of 20 horse power or less; $6 for each one exceeding 20 and less than 40 horse power; and $10 for each one of more than 40 horse power. If he shall operate an automobile or motor vehicle for more than sixty days, he shall be subject to the same provisions as apply to residents, the amounts already paid to be deducted from the fee required.

Local Road Administration.—The county is not known in highway matters. The town is the unit. Each town is assessed 5 per cent on its grand list and that sum is reapportioned to them on a basis of mileage. This naturally makes the larger and wealthy towns contribute to the benefit of the smaller and poorer towns. Beyond this 5 per cent tax, each town may vote additional sums. If it does, it secures the aid of the State to a like amount up to $750.

Maintenance Fund.—The maintenance fund, created by the fees from the registration of automobiles, is the only other fund and form of taxation. This amounts to, say, $60,000 per year, and is used to repair the main highways and those that have been improved with State money.

VIRGINIA

State Highway Commission.—A State highway commissioner shall be appointed by the governor, subject to confirmation by the general assembly, for a term of six years, and shall receive $3000 a year and actual traveling expenses. The commissioner together with the professors of civil engineering of the University of Virginia, the Virginia Military Institute, and the Virginia Agricultural and Mechanical College and Polytechnical Institute, who shall receive only their actual expenses, shall constitute the State highway commission. The State highway commissioner shall be a citizen of the State and a civil engineer versed in road building. He shall have an assistant who shall be a civil engineer, and may employ other assistants and clerks, subject to the approval of the governor and the other members of the commission.

The State highway commissioner has general supervision over construction and repair of main traveled roads of the State; may recommend to local authorities and to the governor needed improvements in the public roads; shall supply technical information upon road building when requested, and publish such information as may be generally useful for road improvement. He may call into consultation the other members of the State highway commission. He shall also collect information and disseminate the same through farmer's institutes, bulletins of the board of agriculture, or otherwise.

State Aid by Convict Labor.—Whenever the local authorities of any county propose to permanently improve any main road they may apply to the State highway commissioner for a competent civil engineer to view the road. If the commissioner be satisfied that the proposed improvement will be permanent and become a main road and that the plans proposed are adequate and practical, he shall prepare plans, specifications and estimates of cost, a copy of which shall be submitted to the local authorities. If the local authorities then decide to improve said road they may apply to the State commissioner for State aid under the provisions of this act, agreeing to supply the necessary materials, tools and teams and to have the work done under the supervision of a civil engineer, to be supplied by the State highway commissioner, at a salary not to exceed $1200 a year to be paid by the county. The State commissioner may then make requisition on the superintendent of the penitentiary for such number of convicts as he may deem necessary under the plans and specifications agreed upon. The State highway commissioner shall as far as practicable give equal service to each county desiring to accept the benefits of this act.

The law of 1906 relating to the use of convicts on public roads was amended so as to provide that upon conviction of any felony prior to May 1, 1913, when the judgment is fixed either by the judge or jury to confinement in the penitentiary for a term not to exceed five years, it shall be lawful for the court instead of sentencing the prisoner to the penitentiary to sentence him to hard labor on the public roads and other public works for an equal period of time. The prisoner is then to be delivered into the custody of the superintendent of the penitentiary and become a member of the State convict road force. After May 1, 1913, prisoners convicted of felony shall be sentenced to the penitentiary and after that date all male prisoners confined in the penitentiary shall be subject to work on the State convict road force or other public works except such convicts as the superintendent of the penitentiary shall deem it unsafe to put on the convict road force. Such convicts may be hired out to work in the penitentiary or employed in the penitentiary or at the State farm. The law further provides that the present contract for the hire of convicts will not be renewed or shall any other contract be made to work them if it be found practicable to work them without a contract.

Said road force shall be under the direction of a civil engineer appointed by the State highway commissioner, or of a guard or guards designated by the State highway commissioner for the purpose, who shall be well versed in road building. The assistant, clerks, and guards, employed by the superintendent of the State penitentiary shall carry out the orders of the State highway commissioner.

An appropriation of $145,000 is made for 1913 as the convict road force fund.

If the local road authorities desire to make permanent improvement by contract and desire the aid of the State convict road force, the State highway commissioner may upon request arrange to supply such county with available convicts not to exceed such number as that, estimating labor at $1 per day per convict, exclusive of Sundays, will amount to a contribution on the part of the State of more than 40 per cent of the total contract price of such proposed improvement. The convicts so employed shall be under the supervision of the superintendent of the penitentiary and the State highway commissioner.

Felony convicts whose sentences do not exceed five years may be sentenced to hard labor on the public roads.

State Money Aid.—The local road authorities of any county may make application to the State highway commissioner for State money aid, and the same proceedings are had with respect to approval or dispparoval as in the case of aid by convict labor, except that in making application the local authorities shall agree that the county will bear one-half of the cost of such permanent improvement. The State highway commissioner shall advertise for bids, and the local authorities shall award contract subject to the approval of the State highway commissioner. If no satisfactory bid is received the local authorities may furnish materials, and construct the road in accordance with plans and specifications not to exceed the cost estimated by the commissioner.

The work shall be done under the actual supervision of the State highway commissioner or an assistant. The expense for such improvement shall be borne, 50 per cent by the State, 50 per cent by the county and smaller divisions thereof, provided that out of the State money aid a sum equal to 5 per cent of the total amount and the amount to be received locally in accordance with this act, shall be made available for the purpose of enabling the State highway commissioner to employ assistants. The State money aid shall be apportioned among all the counties of the State according to the total amount of State taxes paid by the respective counties. In case the funds apportioned are not applied for before March 1, each year, the same shall be apportioned among the counties which have made application for State aid in a sum greater than the amount of their apportionment. Any county which bears more than 50 per cent of the expense of permanent road improvement shall be entitled to receive its annual apportionment until its receipts from the State shall equal 50 per cent of the cost of such permanent improvements. The county road authorities may determine what part of this 50 per cent of expense shall be borne by the county and what part by the subdivisions of such county.

Counties are not entitled to receive both convict labor aid and money aid in the same year.

Any county in the State may use its apportionment of State money in the construction of bridges.

The sum of $180,000 and the automobile taxes were appropriated for 1913.

Local Road Administration.—The boards of supervisors of their respective counties have jurisdiction over all roads and bridges therein. Each county is divided into magisterial districts and a supervisor is elected for each such district. The supervisors from the several magisterial districts constitute the board of county supervisors.

The board of supervisors of each county shall biennially appoint, by a majority vote, a county superintendent of roads, who shall be a person versed in road building. The board of supervisors may, however, in their discretion, appoint such a superintendent of roads for each several magisterial districts of the county, or one for two or more of such districts, and when all such districts are provided with such superintendents, the said supervisors may or may not, in their discretion, appoint a superintendent of roads for the whole county.

The board of supervisors of any county not operating under a special road law may divide the county into road districts and may call a meeting in each such district to adopt by-laws and elect officers, to consist of a chairman, a secretary, a treasurer and one or more road surveyors, who shall have charge of the roads of such said district and hold office for one year.

The statute labor has been abolished.

A county road tax of not exceeding 40 cents on each $100 of real and personal property valuation in the county, not included within the limits of incorporated towns and cities, shall be levied by the county board of supervisors.

Said board of supervisors shall also annually levy a district road tax of not to exceed 40 cents on each $100 of property valuation in the several magisterial districts of the county, not included in any incorporated cities and towns. Said levy may vary in different districts.

A special subdistrict road tax may be levied, if favored by a majority vote of the free-holders of such said district, which tax shall not exceed 50 cents on each $100.

Bond Issues.—County bonds may be issued on a majority vote of the electors thereof, the amount of bonds not to exceed 10 per cent of the taxable valuation of all property.

It is also provided that county bonds may be issued for the purpose of permanently improving the public roads of said county or building bridges therein, upon a three-fifths vote of the electors of the county, in such a manner that the interest thereon at the rate authorized by the board of supervisors shall not require the imposition of an annual tax in excess of 20 cents on the $100.

Legislation was adopted in 1912 providing that the circuit court of any county upon petition of a majority of the board of supervisors or of fifty free-holders of any magisterial district shall make order requiring the judges of election to open a poll and hold an election in such magisterial district to determine whether the board of supervisors of said county shall issue bonds for permanently improving public roads and bridges. The approximate location, width and length of such roads to be improved shall be named in their order and the maximum amount of bonds to be issued, which shall in no case exceed 10 per cent of the total assessed taxable value. If a majority of the qualified voters of the district vote in favor of the issuance of the bonds the circuit court shall at its next term enter an order requiring the supervisors to proceed at the next meeting to carry out the wishes of the voters, provided that any magisterial district may build, repair, improve and alter any road in an adjoining magisterial district joining a road in that district and may assume and pay the bonds and interest therefor.

After the issuance of such bonds a tax shall be levied on all property liable to State tax in such magisterial district to pay the interest and create a sinking fund, such levy not to exceed 90 cents on $100 of taxable property.

The board of supervisors are authorized to apply the sinking fund to the payment or purchase of any said bonds at any time and they are authorized to lend upon real estate security, the loan not to exceed 50 per cent of the assessed value, or to deposit in bank at interest all accumulations of money to the credit of the sinking fund.

The said local road authorities of the county shall apply to the State highway commissioner or shall employ a competent road engineer approved by the State highway commissioner, to make plans and specifications of all roads or bridges to be built from the proceeds of such bond issue and to supervise the work, and they shall let the work to contract, the State highway commissioner and the local authorities to jointly award the contract.

WASHINGTON

Constitutional.—No counties, cities, towns, school districts or other municipal corporation shall, for any purpose, become indebted in excess of 1½ per cent of its taxable property, without the assent of three-fifths of the voters therein at an election held for that purpose, and then not to exceed 5 per cent on the value of taxable property therein.

Administration.—The unit of administration is the county, jurisdiction over the roads vesting in the boards of county commissioners which have charge of all road work, the levying of taxes for road and bridge purposes, and have supervision over the road supervisors.

The said boards of county commissioners are required to divide their respective counties into road districts not exceeding twenty-four, and to appoint one road supervisor to have charge of the roads in each district.

Each county commissioner shall be ex officio road commissioner of the road districts in his commissioner district of which there are three and shall see that all the orders of the county commissioners therein are carried out.

The county surveyor who shall be a civil engineer and an elector of the county is designated as county engineer, and is elected to office. He shall make surveys, submit estimates, etc., and shall annually inspect all bridges and make a written report to the board of county commissioners with recommendations.

The county engineer and the supervisors of the several road districts shall meet with the county commissioners in April to outline road improvements to be made.

Counties may adopt township organization, in which event the roads in each township shall be in charge of the township road supervisor. Said township supervisors may divide their townships into districts and appoint a road overseer for each district (only two counties in the State, however, have township organization).

Revenues.—County bonds may be issued for road purposes, on election, not exceeding 5 per cent of the taxable property in said county. The county commissioners must levy annually the tax necessary to pay the interest on said bonds and create a sinking fund.

County Road aud Bridge Fund.—The county commissioners shall annually levy a tax of not more than 4 mills on the dollar, which shall be payable in money for the general road and bridge fund.

District Road and Bridge Fund.—The county commissioners shall annually levy a tax of not more than 10 mills on the dollar in road districts, which tax shall be payable in money, for the district road and bridge fund.

On petition of the owners of two-thirds of the linear feet of land fronting on any county road to the county commissioners, such road may be improved and the cost assessed against the property within one-half mile of said road. The first 880 feet extending back from the road shall be assessed 45 per cent of the whole cost; the second 880 feet 35 per cent of the whole cost, and the third 880 feet 20 per cent of the whole cost.

Automobiles and Motor Vehicles.—A license fee of $2 is required for each automobile in the State. Non-residents are exempted from this requirement if they have complied with the registration laws of their own State or territory.

County Convicts.—The sheriff of each county shall employ all male persons sentenced to imprisonment in the county jail thereof, in such manner and at such places within the county as may be directed by the board of county commissioners thereof

State Convicts.—All convicts not otherwise employed shall be worked, under authority of the State board of control, in the building of State roads. All expenses, incurred through such employment, shall be paid from the appropriation by the legislature for the construction of the particular road or roads upon which such convicts may be employed. The place where and the manner in which work shall be performed upon State roads by convicts shall be designated by the State highway board.

State Quarries.—The board of geological survey is directed to ascertain the existence within the State of suitable road-making materials, with a view of establishing State rock quarries, to be operated by convict labor. After their report quarry sites are to be selected by the State highway board and plants established, if the State board of control acquires the said quarry sites.

All convicts maintained at State quarry sites, shall be kept continuously employed in the quarry, crushing and handling the material. All rock so crushed shall be upon the request of the State highway commissioner there delivered to the said highway commissioner and used for the construction and maintenance of State roads. All material so used shall be paid for out of the appropriation made by the legislature for the construction or improvement of the particular road upon which it is used and all material furnished to the State highway commissioner, or to any county, city, town, or other municipality after the requirement of State roads work are met shall be at not less than 10 per cent above the estimated cost of production, at the place of delivery. When the quantity of material on hand is in excess of the amount demanded by the State highway commissioner for use on State roads or for disposition to the counties, cities or towns, then the same may be disposed of by the State highway commissioner at such prices, not less than the cost of production, as he may deem most advantageous to the State, giving prior right of purchase to the citizens of the State. The State highway commissioner may also employ any free labor that may be necessary in the operation of State quarries.

All moneys received from the sale of the products of such quarries shall be paid into the State treasury and be kept in a fund known as the "quarries rotary fund," for use in operating the said quarries and crushing plants.

The State highway commissioner is authorized to appoint a superintendent of quarries at not more than $2000 a year, and traveling expenses, removable at the pleasure of the said commissioner. He shall devote his entire time to the management of the various rock quarries of the State. In case there are insufficient funds in the "quarries rotary fund," he shall be paid out of the State highway fund. He shall be subject to the jurisdiction of the State highway commissioner.

For equipping the quarries and crushing plants at Selah, Dixie and Marshall, there was appropriated $100,000 out of the State highway fund. For equipping the Meskill rock quarry in Lewis county, $35,000 was appropriated out of the State highway fund.

Permanent Highway Law.—The State aid law was repealed in 1911, and a new road law was passed known as the "permanent highway law." This law provides for a tax of 1 mill on all property in the State, the proceeds of which shall be paid into the State treasury and applied to the "permanent highway fund." The amounts received from each county are to be credited to the county paying the same until such time as it shall be expended on contract for permanent highways in such counties; 15 per cent of the cost may be assessed on abutting property and balance paid from "permanent highway fund." When a piece of road is completed under the provisions of this law the highway commissioner is required to inspect the road and certify to the State auditor that the work has been done according to the plans and specifications, to be first approved by him, before the contractor can be paid the final 20 per cent on the contracts.

State Highway Department.—There was created the office of State highway commissioner and a State highway board. The State highway commissioner shall be appointed by the governor for four years, unless sooner removed for cause. His salary shall be $5000 a year, traveling and other expenses. A $10,000 bond is required of him. The State highway board shall be composed of the governor, the auditor, the State treasurer, the State highway commissioner and a member of the State railroad commission, to be named by the governor. Each shall be allowed his actual traveling expenses.

The State highway commissioner shall keep a record of all proceedings. He shall prepare and submit, ninety days before the session of each legislature, a report of the work of the year, shall make recommendations as to the needed State highways, with estimated cost thereof. It shall be the duty of the State highway board to apportion the amount of appropriation for any State road which shall be expended within boundaries of the several counties through which it may pass.

In addition to his other powers and duties the State highway commissioner shall compile statistics and collect information relative to public highways throughout the State. He may be consulted by county officers and shall coöperate with all highway officers and assist county authorities in whatsoever manner he can.

All officers who may have the supervision of public highways and bridges, shall upon the written request of the State highway commissioner furnish him with all available information.

State Roads.—The "public highway fund" is now expended on State roads upon specific appropriation therefor by the legislature.

WEST VIRGINIA

Jurisdiction over roads vests in the county court of the respective counties. The county court of each county may appoint a county road engineer, who should be a practical road builder or civil engineer and shall have charge of the execution of all road work in the county, subject to the county court.

In the event the county court shall not appoint a county road engineer, then it shall appoint a competent man as road supervisor for each magisterial district, who shall, under the direction and control of the county court, divide their respective districts into convenient road precincts not exceeding 10 miles in length and after due advertisement, let the construction and repair of same to contract.

The county court of each county levies upon all property taxable for State and county purposes, such taxes as may be necessary for the construction and maintenance of the public roads, provided, however, that in 47 counties the limit of taxation for all county purposes is 30 cents on each $100 taxable valuation.

A road poll tax of $1 is assessed against every able-bodied male between the ages of twenty-one and fifty years.

Counties may issue bonds, not exceeding, in the aggregate, 2½ per cent of the value of the taxable property of such county, a three-fifths majority of all votes cast at the election therefor being necessary.

When the county court of any county deems it desirable for any district thereof to appropriate money to construct roads throughout said district, upon the petition of fifty regular voters, who are free-holders of said district, they shall submit the proposition of issuing bonds therefor to the regular voters of said magisterial district and upon a majority vote of three-fifths of the voters of the district, voting upon such proposed bond issue, the county court shall then have authority to issue the bonds, in such amount as voted, not to exceed 2½ per cent of the taxable valuation of said magisterial district.

All State licenses for motor vehicles are issued by the State auditor.

All road taxes are payable in cash.

WISCONSIN

Road Government.—General charge of the roads in the towns is in the hands of the town boards consisting of three members elected annually. These officials divide their towns into a number of road districts (the number varying from 1 to 50) and place a road superintendent or path-master in charge of each district. County boards are authorized to vote on the method of paying road taxes in their county. More than half the counties vote cash tax.

The law provides for the selection of a continuous system of roads in each county by its county board. This system is known as "the county system of prospective State aid highways" and these roads may be built by the town, county, and State jointly, each paying one-third of the cost. Bridges over 6 feet in span are paid for two-fifths each by town and county and one-fifth by the State.

Improvements on this system are made by a county highway commissioner (selected by the county board) under the general direction of the State highway commission. Counties can pay two-thirds or four-fifths of the cost of work and the State pays one-third or one-fifth just as if towns had petitioned for improvement. After improvement stone or gravel roads and bridges are maintained by the counties. Dirt roads (grading work) done under State aid are still to be maintained by the towns as are the unimproved portions of the system.

State Highway Funds.—The State aid law was passed by the legislature of 1911. It appropriates $350,000 State money annually for road and bridge construction and also $40,000 annually for engineering and other expenses of the commission. The commission consists of five members who get traveling expenses but no salary. The dean of the college of engineering of the State University and the State geologist are members ex officio. The three other members are appointed by the governor.

WYOMING

Constitutional.—For State revenue there shall be levied annually a tax not to exceed 4 mills on the dollar, except for the support of State educational and charitable institutions and the payment of the State debt and interest thereon.

For county revenue there shall be levied annually a tax not to exceed 12 mills on the dollar for all purposes, exclusive of State revenue, except for the payment of its debt and the interest thereon. An additional tax of $2, for each person between the ages of twenty-one and fifty years, shall be levied for county school purposes.

No incorporated city or town shall levy a tax to exceed 8 mills on the dollar in any one year, except for the payment of its public debt and interest thereon.

The State shall not, in any manner, create any indebtedness exceeding 1 per cent on the assessed valuation of taxable property therein, except to suppress insurrection or provide for the public defense and no debt in excess of the tax for the current year shall be created unless the same shall have first been submitted to a vote of the people and by them approved.

No county shall, in any manner, create any indebtedness in excess of 2 per cent on the assessed valuation thereof and no debt in excess of the taxes for the current year shall be created by any county or subdivision thereof without the proposition therefor having first been submitted to a vote of the people and approved by them.

Statutory.—All county roads are under the supervision, management and control of the board of county commissioners of the counties wherein they are located. All roads within the State, declared by law to be national, State, territory or county roads, are public highways.

The county commissioners of any county may divide the county into road districts and the voters of each district shall elect a district road supervisor; and if the county be not divided into road districts, then the voters of the county shall elect a county supervisor, for two years. Said supervisor of roads, whether county or district, shall give bond for the faithful discharge of his duties, shall receive $3 per day for his services while actually engaged and shall be under the control of the county board of commissioners.

Taxation.—The board of county commissioners of any county may levy upon each able-bodied man, between the ages of twenty-one and fifty years, except those exempt by law, a poll or special road tax of $2.

For county revenue of all purposes there is levied annually a tax not to exceed 12 mills on the dollar. From the general fund so collected the county commissioners appropriate money for road purposes.

Convict Labor.—Any convict may be put to work upon the highways and streets.

An act has been passed designating certain highways as a system of public highways and providing for their improvement by the labor of prisoners sentenced to the State penitentiary, under the control of the State commission of prison labor.

The supervision of the work shall be under such persons as may be selected by the commission and eight hours shall constitute a day's work. Said commission shall adopt rules for granting privileges to prisoners employed on the highways, with special reference to the granting of additional "good time" allowances in cases of prisoners serving short term sentences, and better food for prisoners serving life sentences; such privileges being conditional upon good behavior and efficient work.

All locations and surveys of such highways shall be done under the direction of the State engineer. The county commissioners of the several counties are required to secure the rights-of-way and to construct necessary bridges, in accordance with plans made by the State engineer; provided that, so far as practicable, bridges across small streams shall be constructed by said convict labor. Any material necessary for said bridges shall be paid for by the respective counties wherein the same are located.

In incorporated cities and towns, along said public highways, the municipal authorities shall construct and maintain such highways. The sum of $10,000 is appropriated for purchasing the necessary tools, implements, supplies, equipments and other necessary expenses for the prosecution of the same.

TYPES OF ROADS

Earth Roads

The importance of earth roads is indicated by the fact that of the approximate mileage of 2,200,000 in the United States, 2,000,000 are classed as earth roads. The work in the future upon earth roads should contemplate (1) proper drainage, (2) reduction of grades, (3) improvement of alignment, (4) betterment of the road surface.

Proper Drainage.—The prevailing defect in earth roads is poor drainage and this defect is the first one which should be remedied. Drainage is for two purposes, first to remove water which reaches the surface of the road by precipitation or otherwise and, second, to remove under ground water which reaches the road from adjacent land or through the top surface. Surface drainage is accomplished by securing a reasonably firm crowned traveled roadway and by providing broad shallow ditches of good alignment and uniform grades and with ample outlets. Subdrainage to remove water from beneath the road surface or to prevent its presence in the roadbed is accomplished most effectively by socalled blind drainage or French drains or special sub-side-drains. There are also other methods. These methods include center subdrains or V-shaped drains or sometimes rock bottoming in the form of a rough telford construction. The best side-drains consist of a trench 3½ feet deep, 15 inches wide at the top, in which is laid an open bell joint glazed tile 4 to 6 inches in diameter with the bells up hill and the trench back filled with broken stone or coarse gravel. The main purpose of these drains is to intercept ground water. The joints of the pipes should be left open and the drains should lead into a proper outlet so that the water may go entirely away from the road. One such drain upon the up-hill side of a road will frequently remedy the worst conditions due to the presence of water. The V-drain consists of a shallow V-shaped trench under the entire traveled way which is back filled with field stones or cobbles. Such construction requires considerable excavation but is somewhat cheaper than two side-drains. The excavation must be 12 to 18 inches deep at the center and 6 to 8 inches deep at the edges. It should be back filled with stones ranging from 6 to 10 inches in diameter with the largest in the bottom. To dispose of water collected by this drain, trenches should be dug about every 50 feet and back filled with stone. These trenches should lead entirely away from the road so it is seen that this construction is mainly available for either roads located over fills on boggy land or on side-hills when the outlets will of course be on the down hill side only. Subdrainage should not be undertaken without proper lines and grades furnished by an engineer as it is expensive and if properly put in would constitute sufficient drainage for any subsequent improvement of the road by macadamizing or otherwise.

Returning to the matter of surface drainage, the earth road should be kept free from ruts by the use of the road drag or otherwise and a crown of 1 inch to the foot should be preserved. Water is thus shed toward the sides. The side ditches collect surface water and must be kept free. On heavy grades they will tend to wash and may require paving in the worst cases. The wash may usually be prevented by providing sufficient outlets to reduce the volume of water. A common defect in earth roads is failure to provide side-drains to discharge water away from the roads Surface drainage is greatly hampered and interfered with by drive-ways leading into private grounds. Raised drive-ways across open gutters divert the water into the center of the road and unfortunately in most instances where tiled drains have been placed, they have become broken or clogged and every considerable rain storm threatens the destruction of a portion of the roadway. The only point where such a drive-way is safe is at the top of a grade. Even when drive-ways are provided with under drains it is common to find that the drainage of the drive-way itself runs into the road. Surface drainage then upon earth roads demands fearless treatment of the drive-way problem. It would probably pay in most instances to pave the bottom of the gutter where the drive-way crosses it and leave the side drainage free.

When it becomes necessary that drainage water cross the road, ample culverts must be provided. The worst fault common to culverts is that they rapidly become clogged with leaves or other rubbish. They should therefore be of more than sufficient size in the first instance. When less than from 2 to 3 feet of earth cover tile pipe, it is liable to become broken. The prevalent defect on earth road construction in the matter of culverts is that they are too small and too near the surface. It will pay even in earth road construction to install more expensive culverts in the first instance rather than to rip them up for repairs at frequent intervals.

Grade and Alignment.—The worst grade on any road is the effective limitation of traffic. After a grade exceeds a rise of 6 feet in the hundred it is serious. Grades may be avoided or reduced either by relocation in part or by excavation and embankment. The best treatment of earth roads in the matter of grades is to establish once and for all a definite, permanent grade with the engineer's level. It need not follow that the entire road is to be graded but with the grade line in mind the worst hills may be cut down and the worst hollows filled up and year by year the entire road will progress toward a final and satisfactory profile. Much money has been wasted by not adopting such a grade line at the outset. In the matter of relocation it is, of course, impossible for a road well established in the community to be entirely changed or abolished in most cases. Grade improvement may have to be brought about by relocating smaller portions of earth roads. Here, again, the services of a surveyor or experienced road supervisor with a transit will prove economical in the end. Some necessary relocation may be undertaken each year. In reducing grades or relocating for earth roads, it is not necessary that all cuts and fills should balance as excess of material may always be used to widen fills and a deficiency of material can usually be supplied by widening the cuts. In the matter of roads over rocks or ledges, it is cheaper to fill up hollows with borrowed earth than to undertake excessive rock cutting. In constructing or repairing an earth road, it is quite common to use the scraping grader or road machine. Where work with this machine is undertaken the width of the road between gutters should be determined. It is a common fault to to find earth roads too wide. Twenty-four feet between gutter lines is ample for a road which a community is not warranted in improving by macadamizing or otherwise hardening its surface. Frequently 20 or 18 feet is a sufficient width. With the width between gutters in mind, a line of stakes should be set before the grader begins its work. The line of stakes along each gutter will improve the work of the grader and leave gutters which will not tend to cause wash into the road.

Surface Betterment.—When it is desired to spread new material upon an earth road care should be taken to secure it from the best available supply. It is not good practice to place gravel in patches upon an earth road to fill hollows. Materials should be spread uniformly upon the traveled way and should be applied for a considerable distance and the ends of the application should be reduced in depth gradually so as not to form a new chuck hole. The object of the scraping grader is to simultaneously construct gutters or side-drains and place material for a crown in the center.

Right here is opportunity for a great improvement in earth road work. Sod, leaves, vegetable matter and rotted material of any description can never form a road surface. There are two ways of using the grader. It may be operated at first to cut the surface only and scrape all perishable material into ridges which are later carted away or the grader may be run regardless of sod and other poor material and men with rakes and forks can then follow it and remove all objectionable matter into dump wagons. Old roads are frequently in such condition that it is better to scrape the shoulders and gutters away from the center and remove the entire mass. Frequently this operation alone will result in a well established and crowned roadway with live material for its surface.

Conclusion.—The earth road problem today is a problem of repair and maintenance. No earth road will endure travel without constant care. The use of the split-log drag which is described in the paragraph upon maintenance is the best method for preserving road surfaces and establishing proper surface drainage from the traveled way to the side ditches. Earth road repairs will become unnecessary in proportion to the increased care in road maintenance. It cannot, however, be expected to start any maintenance upon an earth road until it is put in reasonable repair. The repair should follow the lines indicated above, that is to say, earth road repair should include some permanent drainage work, the reduction of some of the worst grades, the straightening of bad curves and the betterment of the road surface by the removal of worn out and objectionable material.

Sand-Clay Roads

A sand-clay road is composed of sand and clay mixed in such proportions as to form a compact and firm support to traffic. The perfect sand-clay road should be neither sticky nor sandy. The sand and clay may form a natural mixture, in which case the road is termed a "natural sand-clay road." The two materials may have become mixed in the fields along the road by successive cultivation of soil, and this soil known as "top soil" is sometimes used in road construction.

There are many varieties of both sand and clay, consequently there is a wide variation in the characteristics of a sand-clay road. Sand while one of the hardest minerals known, possesses practically no binding or cementing power. The grains of sand instead of cohering in a tough mass under the impact of traffic and the action of water, remain loose and shifting. No road is so difficult to travel as the road located through fine sand, and the difficulties are enormously increased when high winds prevail.

Clay is a decomposition product of the mineral feldspar. If the clay has been carried by water the deposit is known as "sedimentary clay." If the feldspathic rock has disintegrated in place, the product is known as "residual clay." The sedimentary clays are in general more sticky and plastic than the residual clays. In contrast with sand, which possesses no binding power but is very hard, clay is a powerful binder, but does not possess the quality of hardness. It is evident that in the construction of a sand-clay road the sand must furnish the quality of hardness amd resistance to wear while the clay must furnish the quality of toughness and bind the individual sand grains firmly together.

The theory of the sand-clay road is very similar to the theory of the macadam road. In the latter, rock dust and screenings fill the voids between the angular fragments of stone and when wet serve as a cement or binder. The grains of sand may be likened to the angular fragments of stone and clay to the rock dust binder. In the most successful sand-clay road, just a sufficient amount of clay is used to fill the voids between the grains of sand. In this way, the sand sustains the wear, while the clay serves as a binder. If too much sand is used, the result will be loose sand on the surface; if too much clay is used, the surface of the road will become sticky after rains.

The best mixture of sand and clay can be made when the materials are wet, and particularly is this true of the "ball clays." The more water that is used, the better the mixture, and if practicable, the materials should be puddled. A disk harrow may be used to advantage.

The extent to which the mixing can be carried on will depend largely upon the character of the clay. If it is a very plastic clay, much greater effort will be necessary to obtain a complete mixture; if, on the other hand, it is a slaking clay, the mixing will be much less difficult. Slaking clays are not as satisfactory, however, as the ball clay, as their binding powers are much less. In selecting clay for road purposes, it is always best to select the stickiest clay available. A common test is to wet the thumb and place it against a piece of clay. If the clay sticks to the thumb, it is reasonable to suppose that it will stick to the sand; if it will not stick to the thumb, it is safe to assume that it will be a poor binder in a sand-clay road.

If the clay is placed on sand to a depth of 6 inches, a cubic yard of clay will cover 54 square feet, consequently a 16-foot road treated in this manner would require about 1 cubic yard of clay for each 3 feet of length. A mile of 16-foot road would, therefore, require 1760 cubic yards of clay. The amount that can be hauled by the average team varies from two-thirds to 1 cubic yard, according to the character of the road over which the hauling is done.

If the clay sub-soil is to be treated with sand, it should be plowed and harrowed to a depth of about 4 inches. On this prepared sub-surface should be placed from 6 to 8 inches of clean sand, spread thickest at the center and sloping to the sides in much the same manner as the clay is applied to a sand road. These materials should then be mixed dry instead of the wet mixing, which is preferable when clay is applied to sand. This is preferable, because the clay can be better pulverized when in a dry state. After the dry mixing, the road should be heavily sprinkled or should be puddled after the first heavy rain. After the materials are thoroughly mixed and puddled, a road machine or grader should be used to give proper crown to the road, and if a roller is available the road can be improved by the use of it. As it is impossible to determine exactly the proportions of sand and clay to be used in the first place, it is necessary to give careful attention to the sand-clay road for a considerable time after it is completed, in order that additional sand or clay may be applied as needed.

Gravel Roads

There are three important qualities which should be possessed by road-building gravel—hardness, toughness, and cementing or binding power. Of these three qualities, the last is the most important. This binding quality is due in part to the presence of oxide of iron, lime, or clay, and in part to the angular shape and size of the pebbles composing the gravel. Blue gravel is generally conceded to be the best for road construction, because it is usually derived from trap rock. As the pebbles composing the gravel retain the characteristics which they formerly possessed as a part of the larger rock itself, it follows that as trap rock is considered an excellent material for road building, trap rock gravel should occupy the same relative rank among the gravels. Quartz possesses practically no binding power, although it is very hard. Therefore, gravel which contains an exceptionally large percentage of quartz will not prove successful, as it will fail to consolidate unless it contains binding material, or unless a good binder is added. This, however, is not true of the chert gravels which bind and consolidate very well forming excellent roads.

The shape and size of the pebbles composing the gravel have an important bearing upon its value as a road material. In order that the material may bond readily, the pebbles should be angular and should vary in size so that the smaller fragments may fill the voids between the larger pieces. Gravel obtained from streams is usually inferior to pit gravel for the reason that the action of the water has worn the pebbles smooth and practically all the fine binding material has been removed by the same agency. Even if clay or loam is mixed with river or creek gravel, the result is not likely to be as satisfactory as that obtained by the use of pit gravel. Pit gravel frequently contains too much clay or earthy matter, while river gravel may have too much sand. In such cases it is advisable to screen the gravel so as to eliminate the material which is too fine and that which is too coarse. The screen should be similar to that which is used in preparing material for a macadam road. In the handling of the gravel care should be exercised not to separate the binding material from it, nor should this binding material be allowed to settle to the bottom in spreading the material over the road surface. It will often be found advisable to spread a thin layer of such binding material over the surface after the material has been distributed and rolled, and after this the surface should be sprinkled and rolled again, or else rolled while still damp from the rains.

When the gravel, especially that which is to constitute the surface layer, contains large pebbles, these should be removed and either thrown aside or else raked into the foundation or recrushed. At least 60 per cent by weight of the gravel should be pebbles above one-eighth inch in size, and there should be no pebbles in the bottom layer that will not pass through a 2¼-inch or 3-inch ring, and in the top layer there should be no pebbles which will not pass through a 1½-inch ring. Not over 20 per cent of the mass should be clay, and this should be uniformly mixed and should contain no large lumps. Ten or 15 per cent of clay produces better results than 20 per cent. If the foundation or road bed is loose, it should be carefully rolled. It is quite as important to have a solid foundation for a gravel road as for a macadam road. Gravel will compact to about 80 per cent of its depth, loose measure. If the compacted depth of the gravel road is to be 8 inches and the width 12 feet, it will take about 2250 cubic yards of gravel to the mile, and it is best to make the first layer about 6-inches in depth, loose measure, and the second layer about 4-inches in depth, loose measure.

Gravel should not be dumped directly on the road, as this will usually result in a rough, uneven surface. A carefully staked out sub-grade or "box" with earth shoulders is necessary. The sub-grade should be rolled. If specially devised spreading wagons are not used, the gravel should be dumped on boards and spread from them on to the road. The gravel should be placed on the road commencing at the end nearest the gravel pit in order that the teams may aid in packing the material.

Each layer of gravel should be rolled separately with a power roller; the rolling should begin at the sides and continue toward the center until the surface is thoroughly compacted. The surface layer should be sprinkled while the rolling is in progress, but if a roller and sprinkler are not available, the road should be constructed during the wet season of the year, as the rains will cause the material to pack much better than if the road were built during the dry season.

The split-log drag, or some similar device, can be used to advantage in maintaining gravel roads but it will be necessary to use hand rakes to remove excessively large stones which appear on the surface. New gravel must be uniformly spread from time to time.

Macadam Roads

The macadam road takes its name from John L. Macadam, whose biography appears in this volume. The word *macadam* denotes a surfacing composed of angular broken stone bound together, whose voids are filled with stone screenings flushed with water, and which is consolidated by rolling, into a practically impervious crust, superposed on a thoroughly compacted foundation or subgrade. Both the exposed surface and the subgrade have a crown or slope from center to sides.

A good macadam road should have (1) proper location, (2) easy grades, (3) perfect drainage, (4) firm subgrade or foundation, (5) broken stone with good wearing and bonding properties and (6) careful inspection during the construction. Proper location and easy grades are more essential for macadam roads than for less expensive types of roads for the reason that unless right at the outset they cannot be changed without extraordinary expense.

Perfect Drainage.—Drainage must remove water from the road surface and the foundation and carry it entirely away from the road. The properly completed macadam surface sheds water into broad open side ditches by virtue of the road crown. The side ditches may have to be paved upon steep grades especially where they carry considerable water from adjacent land. When ditch water must cross the road, catch basins are usually necessary and ample culverts should be provided of first class construction (see article on culverts). To drain the road foundation or subsoil, side-drains with tiled pipe and stone back fill are most effective. Where considerable field stone is present a shallow so-called V-drain forming the entire subgrade is cheaper than two side-drains and equally effective in providing sub-drainage. The V-drain filled with stone not greater than from 8 to 10 inches in diameter with the larger stones at the bottom, should be brought to the true crown and rolled and it should have frequent outlets entirely away from the road. When properly built, the V-drain offers an excellent foundation for the macadam surface. In particularly damp or boggy spots a telford foundation or bottoming course of hand laid stone not less than 6 inches in depth is sometimes used. Modern practice, however, seems to favor either the sub-side-drain or the V-drain construction for drainage purposes. Sub-drainage is usually required in heavy cuts on hillside roads and for roads over swampy land.

Subgrade.—After a road has been properly graded and the permanent drainage structures completed, the subgrade must be built. In cuts through firm soil, the subgrade is formed by simply excavating a trench of width and depth equal to the width and depth of the compacted stone surfacing. Spongy material wherever encountered must be removed and replaced by good live earth or gravel. Where loose dry sand is encountered, the utmost care is necessary to prevent the sand from churning into the first layer of broken stone when rolling commences. In fills if the earth has been deposited in layers and subjected to teaming, the subgrade trench or box may be excavated and afterwards thoroughly rolled. Care must be taken to insure that the subgrade is thoroughly solid and it must not wave under the roller. Material excavated from the subgrade is piled along the sides or shoulders to form earth abutments to prevent spreading of the macadam when it is rolled. Too much care and refinement cannot be given to the subgrade or foundation for the macadam. It should invariably be rolled to a true firm surface, clean and without ruts and with perfect crown. There will then be no waste of stone or churning of earth into the lower course to weaken the macadam and the tendency of the finished road to form holes will be largely avoided.

Broken Stone.—Trap rock is the best road stone for plain macadam or "waterbound" macadam construction. It is frequently desirable, however, to use local stone and the Office of Public Roads, U. S. Department of Agriculture, will test stone samples from any locality in this country free of charge. This Office has published complete tables showing the relative merits of nearly all road stones. Road stone should (1) be hard enough to wear well, (2) so tough that the roller does not crush it, (3) and possess bonding qualities to form a smooth unyielding surface. Road stone is usually placed in two courses; the first course ordinarily consists of stones varying in size from 3 to 1½ inches in greatest diameter. The softer stones may be somewhat larger than the denser or tougher material. Ordinarily a roller cannot compact more than 6 inches of loose stone successfully and it is customary for the first course to be rolled separately. The stone is spread either from spreader wagons or from dumping boards. Careless dumping of the stone directly upon the subgrade in piles will result in an uneven finished surface. The first course is sometimes called the no. 1 stone. It is thoroughly rolled with a steam roller until walking does not loosen the stones. Teams hauling stone over the subgrade should guard against cutting ruts or churning the stone in the subgrade soil. Upon the rolled first course, a second course of stone varying in size from 1½ to ¾ inches in diameter is placed to a depth of about 3 to 5 inches in a manner similar to the first course. When the second course stone has been rolled until its surface is smooth and the individual stones are well keyed together and no creeping or wavering appear before the front wheel of the roller, the bonding process commences.

Careful Inspection.—Bonding of a macadam road is accomplished by completely filling the voids in the broken stone with fines or screenings from the crusher. The best practice requires that these screenings be from the same stone as is used in the top course. The process of binding or bonding requires the greatest care. The fines or screenings or stone dust should be worked in the road *gradually*. To accomplish this, the screenings are spread in thin successive courses with alternate wetting by a sprinkling wagon and continuous rolling. Care should be taken that wagons drawing screenings should not cut up the partially built road. When the voids are completely filled mud will flush to the surface in front of the roller and the bonding is complete. If the macadam is well bonded, the road is now strong enough to withstand the kick of a boot-heel.

The width and depth of macadamized surfaces are governed by local conditions. A one-way road may be as narrow as 8 feet. The general practice is to build macadam surface from 14 to 16 feet in width. The thickness of the macadam surface is determined somewhat by the traffic conditions and varies from 5 to 8 inches when complete. Loose broken stone is usually estimated to consolidate about one-third under rolling.

A newly built or green macadam road will sometimes immediately show tendency to ravel particularly if the second course stone is trap rock. This raveling usually cures itself but if it continued, removal of the larger loose stones and additional rolling may be necessary.

Bituminous Macadam Roads

The term "bituminous macadam"[47] was introduced about the year 1906 to designate a macadam road, for which some form of bituminous material was used as a binding agent and to form a surface coat. The desirability of changing from the original type of what is now called "waterbound macadam" was brought about unquestionably by the action of increasing automobile traffic. When the presence of automobiles of various types and speeds became general on macadam roads, it was found (1) that more or less dust was raised from the surface by the passing automobile and that this dust usually was carried away from the road; (2) that the surface of the dry macadam road soon raveled and in the worst conditions completely disintegrated; (3) that it was too expensive to water macadam roads sufficiently to prevent the formation of dust and the consequent destructive effect of excessive automobile traffic.

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[47] In justice to those who claim that the term "Bituminous Macadam" should be used in a much more restricted sense the following definition from the Report of the Sub-Committee on Bituminous Paving Nomenclature of the American Society of Municipal Improvements is given.

(3) Bituminous macadam is a pavement consisting principally of crushed stone and retains its integrity of structure mainly by the mutual support of the various particles of stone, aided by the slight bonding value of the fine mineral matter in its composition, and which is protected from surface disturbances by an upper bonding layer of bituminous material. It is a one-layer pavement and there is no definite distinction to be made between the wearing surface and the base, as in their nature they must be knit together in one structure. Practically all the horizontal stability, as well as vertical

A bituminous macadam road does not differ from the original macadam construction until the process of binding begins. It has been found, however, that the former desirable qualities in road stones, such as hardness, toughness, and cementing qualities, do not play so important a rôle as formerly when the stone in question is to be treated with bituminous material. If we assume then the construction of a macadam road to have progressed through the stages of proper drainage, grading and consolidation of the subgrade, we then place the first course of No. 1 stone upon the rolled subgrade, as formerly. This no. 1 stone is still laid in the same standard sizes ranging from 2½ to 1¼ inches in diameter. After this course has been thoroughly rolled to consolidated thickness, say from 3 to 5 inches, the no. 2 course is than applied. There are two well defined methods for applying this course.

Mixing Method.—No. 2 stone varying in diameter from 1¼ to ½ inch is cleaned and dried. It is then mixed with sufficient quantity of bituminous material to thoroughly coat all the pieces. This may be done by hand labor upon a mixing board, or by raking stones through a bath of the bituminous liquid, or otherwise. The practice of using mixing machines similar to concrete mixers is increasing and with the better types of machines results are satisfactory and the cost is reduced. Practice has shown that it requires in the neighborhood of 1½ gallons of bituminous material per square yard of finished surface, so that if a second course were spread 3 inches thick loose, a cubic yard of stone would require about 18 gallons of bituminous material. After the coated stone has been put in place, a thin layer of clean, sharp fines (from which the best practice demands the removal of the dust) is spread lightly and the course is then rolled with a steam roller. Wherever an excess of bitumen appears on the surface, more fines should be added and

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support, is from the macadam base. The pavement may be produced by adding the bituminous top to the macadam base by either the penetration method or the mixing method. In the former the bitumen is applied in a liquid state and a top dressing of stone or sand is spread over the surface and thoroughly rolled. In the latter the bitumen is mixed with the mineral, consisting of comparatively fine stone or sand, or a mixture of both, and forced into the macadam body of the pavement by rolling. In either case, whether the penetration or mixing method is followed, the macadam base must be specially prepared, with voids in the upper portion into which the bitumen or bituminous mixture penetrates leaving a coating of the desired thickness over the surface.

rolled. After rolling is completed, all surplus fines and dust should be swept from the surface. A seal coat or paint coat or finishing coat of bituminous material to insure waterproofing and complete filling of the voids is now applied. This consists of a uniform application of about one-half gallon to the square yard of surface. Screenings or fines are again applied and the road may or may not be rolled.

Penetration Method.—By the penetration method, the second or no. 2 course of stone is put in place and partly rolled with a steam roller. The bituminous material is then applied either by hand from pouring pots or by some modified hose nozzle leading from a tank cart or by a mechanical distributor. Material for hand spreading is usually brought to the job in barrels; when a tank cart is used, it is generally filled from a tank car at the siding. Bituminous material is heated usually by steam from a steam roller, but when hand pots are used, the material is heated with kettles over fires. The application is about 1½ gallons to the square yard and the object is to penetrate the second course to a considerable depth. It is now considered good practice to apply the bituminous material under pressure from a hose fitted with a proper nozzle to spread the material in a finely subdivided stream, or spray. The object is to secure better penetration and more uniform distribution over the road stones. After the distribution of bituminous material, a light coating of sharp, clean fines or screenings or sometimes sand or clean gravel is applied and rolling progresses. A paint coat of about one-half gallon to the square yard is usually applied, followed by a coat of screenings to complete the construction.

The above description presents a bold outline of bituminous construction and it must be understood that various modifications in processes are practiced, e.g., the no. 1 course may be bound with screenings or no. 2 course may also be partly bound with screenings, even with the use of a sprinkler and subsequent drying of the road. Some engineers prefer to apply the stone without screening into separate sizes with the object of securing the reduction of the voids by the use of crusher run stone. Other engineers have seen fit to use no. 1 stone as the second course. The practice of spreading the broken stone in sizes and then thoroughly mixing by harrow or otherwise, is not uncommon. It is clearly evident that the final standardization of bituminous construction has not yet been reached. In round figures, the cost of bituminous macadam runs about 25 to 40 cents per square yard in excess of ordinary "waterbound" macadam.

Some engineers contend that an ordinary plain macadam construction, followed by a thorough paint coat, is the most desirable form, but this is essentially surface treatment.

A system introduced in England by Arthur Gladwell, now known as the Gladwell system of bituminous road construction, requires the spreading of a mixture of sand and bituminous material or fines and bituminous material over the top of the no. 1 or first course of macadam followed by a no. 2 course of clean, dry stone and a second layer of mixed fines and bituminous material. The three layers are then rolled with a steam roller. The object of this form of construction is to secure a thorough filling of the second course of stone by the mixture of fines and bituminous material from both above and below.

Throughout this description the term "bituminous material" has been used as a generic term and should be read to include all forms of artificial binders which are in common use.

The details of the management of bituminous material are extremely important. It is known that a proper selection of the bituminous binder is vital to the success of construction. Standard specifications for bituminous material are not yet in complete agreement. There are certain chemical tests which it is known that good bituminous material should satisfy. It is quite possible that these chemical tests have not yet developed final form and that additional physical tests should be introduced to enable proper selection of material. For further details as to matter of pressure, temperature, viscosity, etc., the reader is referred to articles upon bituminous road materials.

Brick Roads

Vitrified paving brick have been in use in this country a little more than thirty-five years as a wearing surface for streets and highways. In their early history little attention was given to using them in the most advantageous way, either as to durability or as to the possible satisfaction in their use. It was rather a commingling of varied ideas with a good material, with no definite realization of what is really possible in a brick street constructed under the most approved methods of today.

Vitrified paving brick are manufactured from the less refractory fire clays and shales which are found in almost all of the bituminous bearing deposits throughout the United States. No two deposits of these shales or clays are exactly alike; they do not burn alike either in color or in the amount of heat required to bring them into the best condition adaptable for their use, so that the raw material must receive slightly different treatment at each of the factories. On this account brick of different manufacture differ in appearance.

A brick burned sufficiently to develop the best quality from any one of the clays and shales used is almost impervious; at least sufficiently so that the amount of moisture absorbed, regardless of temperature, does not affect the brick in any way. The adhesion of the particles is brought about by sufficient heat to bring them into a molten state. The process has brought into a new use the word "vitrified" and in connection with the manufacture of paving brick that word is given a new meaning. It does not mean that perfect vitrification is obtained as in the manufacture of glass, but an approach to it, forming a coalescent body.

In the use of vitrified brick for a wearing surface, due consideration must be given to the amount and character of the traffic in determining the width of the road and the character of construction. The amount of money possible to expend must also have due weight. The available local ingredients which may be used in the construction of the road in addition to the brick, must also be taken carefully into consideration. For example, it is necessary to determine whether concrete shall be used as foundation, and, if so, of what the concrete shall consist, or whether there shall be any artificial foundation at all. The question of whether the road is to to be located in the northern portion of the country subject to extreme climatic conditions or in the extreme south where low temperature need not be guarded against is of great importance. The question of drainage also enters materially into the problem.

The type of the road therefore must be influenced by some one or more or even all of the foregoing, as every feature to a greater or less extent bears a particular relation to the economy of the road itself. To illustrate: the black mucky soil of somewhat difficult drainage of northern Illinois where practically all of the thoroughfares are subject to a traffic of numerous and heavily loaded vehicles, and subject also to extremes of low temperature and liable to consequent damage from frost, require the best and more expensive type of roads. In and about the Gulf Coast where the soil for the most part carries a large proportion of sand and is not subject to frost action economical roads can be built without any artificial foundation at all by merely preparing the grade to correspond with that of the finished highway. The requirements for these two types of roads as to local conditions to a very large degree equalizes the cost in respective localities. For instance, in northern Illinois the brick on account of freight rates are slightly less in cost and the material, such as gravel and broken stone, which enter into the foundation are of low cost so that a road built in northern Illinois corresponds in price to the road equally adapted to conditions found in the South and this state of affairs very largely obtains throughout the country, so that the cost of adaptable types is not materially different.

As to the different types and kinds they may be approximated as follows: the best and most expensive type that shall meet severest conditions as well as severest traffic must be made with a carefully drained and thoroughly compacted subgrade, the surface of which shall be made to exactly conform with that of the finished highway. Upon this subgrade must be placed a concrete base finished with a smooth surface and from 4 to 6 inches in depth. On this base a compressed sand cushion to a uniform depth of two inches is placed. Upon this 2-inch sand cushion must be placed the brick with the best edge up. These bricks after being so placed must be rolled and ironed out so that the plane presented by the surface shall be entirely free from any depressions. Following this condition the interstices shall be completely filled with a mixture in uniform preparation of 1 to 1 of sand and portland cement. Provisions shall also be made along either curb for contraction and expansion. The details for installation of this work may be obtained from the National Paving Brick Manufacturers Association by a request for the same addressed to their headquarters in Cleveland, Ohio. The cheapest and least expensive type eliminates from the foregoing the foundation of concrete and even cement filler so that a road in the sandy districts can be made based upon the expenses of the brick, the curb and the preparation of the grade. Intermediate conditions necessarily obtain here and there throughout the country where with good judgment economy may be greatly subserved in the manner and method of building with due consideration of the traffic to which the roads respectively are to be subjected. Let it be thoroughly understood that the highest and best type is not only satisfactory and sanitary but of the greatest durability. However, the cheaper type is ofttimes advisable because of lower first cost and traffic requirements. The maintenance cost of a well constructed brick road is small and its advocates claim that this cost is negligible.

Concrete Roads

Types.—The methods of construction of concrete roads divide them into one course, two course and one and two course covered with bitumen and sand.

Materials. 1. Portland Cement. The cement shall meet the requirements of the United States government for Portland cement or of the standard specifications for Portland cement of the American Society for Testing Materials.

2. Fine Aggregate. Fine aggregate shall consist of sand crushed stone or gravel screenings, graded from fine to coarse, and passing when dry a screen of $\frac{1}{4}$ inch mesh. It shall be preferably of silicious material, clean, free from soft particles and dust (both loose and occuring as a coating on the grains,) loam, vegetable or other deleterious material; and not more than 3 per cent shall pass a sieve having 100 meshes per lineal inch. Fine aggregate shall be

of such quality that mortar composed of one part Portland cement and three parts fine aggregate, by weight, when made into briquettes, will show a tensile strength at least equal to the strength of 1:3 mortar of the same consistency, made with the same cement and Standard Ottawa Sand. In no case shall fine aggregate containing frost or lumps of frozen material be used.

3. Coarse Aggregate. Coarse aggregate shall consist of inert materials, such as stone or gravel, graded in size, retained on a screen of $\frac{1}{4}$ inch mesh, and passing a screen of $1\frac{1}{4}$ inches mesh. It shall be clean, hard, durable and free from all deleterious matter and shall contain no soft flat, or elongated particles. In no case shall coarse aggregate containing frost or lumps of frozen material be used.

4. Natural Mixed Aggregates. Natural mixed aggregates shall not be used as they come from deposits, but shall be screened and remixed to agree with the proportions specified.

5. Water. Water shall be clean, free from oil, acid, alkali, or vegetable matter.

Equipment.—In addition to the usual equipment needed in the preparation of the subgrade or foundation for all types or roadways, for the construction of a concrete roadway, there will be required a good concrete mixer preferably of the batch type provided with traction power and a swinging boom and bucket from which the concrete can be deposited in place, a sufficient amount of 2-inch lumber for side forms, a set of forms for constructing expansion joints, wheelbarrows, shovels, the finishing and other small tools owned by every contractor doing concrete work and some means for hauling materials.

On large work, on long hauls or in districts where men and teams are scarce, hauling with traction engines has been found to be most economical, and the comparatively large amount of water required can probably be best attained from the nearest source of supply by pumping through small metal pipe lines with small gasoline engines, rather than by hauling in tank wagons with teams.

Foundation.—The subgrade or foundation upon which concrete is to be laid should be brought to a firm unyielding surface by rolling, and all soft, spongy or yielding spots and all vegetable or perishable matter should be entirely removed from the subgrade and the space refilled with gravel, broken stone or other suitable material. Special attention should be paid to drainage and water must be kept from reaching the foundation by means of open ditches or tile or French drains, provided with suitable outlets. Old macadam or gravel roadways make ideal foundation upon which to lay concrete, provided all the holes in the surface are filled with stone and the crown is made to conform as near as possible with the crown of the finished road.

One-Course Roadway.—Upon the properly prepared subgrade should be deposited at least 6 inches of concrete made in the proportion of at least one bag of Portland cement, 2 cubic feet of fine aggregate and 4 cubic feet of coarse aggregate. The mixture should be laid in a sloppy wet condition and the surface struck off with a template cut to the proper shape of the road and running on the side forms. The surface should be troweled with wooden floats after it is shaped, and when the excess moisture has disappeared should be roughened by the use of a stable broom.

Two-Course Roadway.—Upon a properly prepared subgrade should be laid at least 4½ inches of properly proportioned well mixed concrete base. The concrete should be mixed in the proportion of one sack of cement to not more than 3 cubic feet of fine aggregate and not nore than 5 cubic feet of coarse aggregate. The concrete should be mixed as wet as is practicable, and should be placed as soon after mixing as possible but in no case should more than thirty minutes elapse between the mixing and the placing of the concrete base. The concrete base should be deposited in strips extending across the full width of the area paved and should be brought to a surface the thickness of the wearing surface below the finished surface of the roadway.

The concrete base before it begins to harden should be covered with a wearing surface at least 1 inch thick composed of one sack of cement and not more than 2 cubic feet of suitable fine aggregate. A mortar consisting of one part cement and two parts of a mixture of three parts ¼-inch to ½-inch crushed granite and two parts ¼-inch to ½-inch crushed granite and two parts ¼-inch granite screenings free from dust makes a first class wearing surface.

The wearing surface should be placed as soon as it is mixed and in no case should more than forty-five minutes elapse between the mixing of the concrete base and the covering of same with the wearing surface.

The wearing surface should be finished with a wood float and before it has completely hardened should be slightly roughened by brushing with a stiff brush or broom.

Joints.—To provide for free movement of the concrete, the road should be laid with joints of ⅛-inch width not more than 25 feet apart. Such joints should be vertical and extend entirely through the concrete. They should be filled with tar paper or a waterproof filler.

Crown.—The road should be given a crown at the center of at least $\frac{1}{100}$ and not more than $\frac{1}{75}$ the width of the road.

Covering of Bitumen and Sand.—A wearing surface of bitumen and sand may be placed upon the concrete road. After the concrete has hardened for at least ten days, the surface of the pavement shall be thoroughly cleaned and dried and hot bitumen shall be applied to the surface by means of a sprinkling wagon designed for the purpose or by suitable hand sprinkling cans. The hot bitumen shall be evenly distributed over the concrete by brushing with suitable brooms or by spreading with squegees immediately after applying, and shall then be covered with the kind of material specified as fine aggregate. For each square yard of pavement there shall be applied one-third to one-half gallon of bitumen. Upon this shall be spread approximately one cubic yard of fine aggregate for each 150 square yards of pavement.

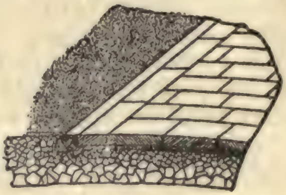
Asphalt Blocks on Country Roads

As designed and manufactured for use on country roads, the asphalt blocks are 5 inches wide, 12 inches long, and 2 inches deep, weigh about eleven pounds each, and have a specific gravity of about 2.5.

The asphalt block was developed and perfected on the theory that crushed trap rock, on account of its preëminent hardness and inherent grittiness, made the best known material for a roadway surface, the one thing needed being a cement, or binding material, to keep all of the particles permanently in place. This was accomplished by the use of an asphaltic cement to bind together the properly graded particles of crushed trap, the hot mixture being consolidated by tremendous pressure into blocks so dense and free from voids as to be practically non-absorbent. In the asphalt block, therefore, we have an asphaltic concrete, or macadam, mixed, in exact proportions, at a great central plant, under conditions insuring absolute uniformity, and receiving the compression necessary to produce a dense and non-absorbent material.

Not only has a special block been produced, but a special method of construction has been worked out, designed to utilize what is left of the worn and rutted macadam road as a foundation for the blocks. This is accomplished by scarifying the surface, if necessary, filling up the deep ruts, rolling with a heavy steam roller, and laying upon the surface of the old macadam, a bed of cement mortar about 1 inch in thickness, to serve the double purpose of forming a firm unyielding bed for the blocks, and binding them securely to the macadam foundation underneath. By this method the material used in the original construction of the road is not thrown away, but used as foundation for a permanent wearing surface. Where the old macadam is too thin, or too badly worn to be safely used as a foundation, it will be necessary to lay a concrete base, but usually there is broken stone enough in the old macadam to supply what is needed for laying concrete.

A pavement may be laid of any desired width, contour, grade, or crown. It is perfectly feasible to pave one-half of the roadway, or only a narrow strip in the center, and extend the paved area at a later date as traffic necessities require, or as appropriations become available. It is not necessary to set curbstones or heading stones to border or define the paved area, since a row of stretcher blocks held firmly in place by a shoulder of mortar, as shown in the sketch, answers the purpose perfectly and leaves the entire roadway surface smooth and uniform.



A good example of this construction is on the Albany Post Road, through the villages of Hastings-on-Hudson, North Tarrytown and the Town of Mount Pleasant, N. Y., and on the Boston Post Road in Pelham Manor and Rye, N. Y.

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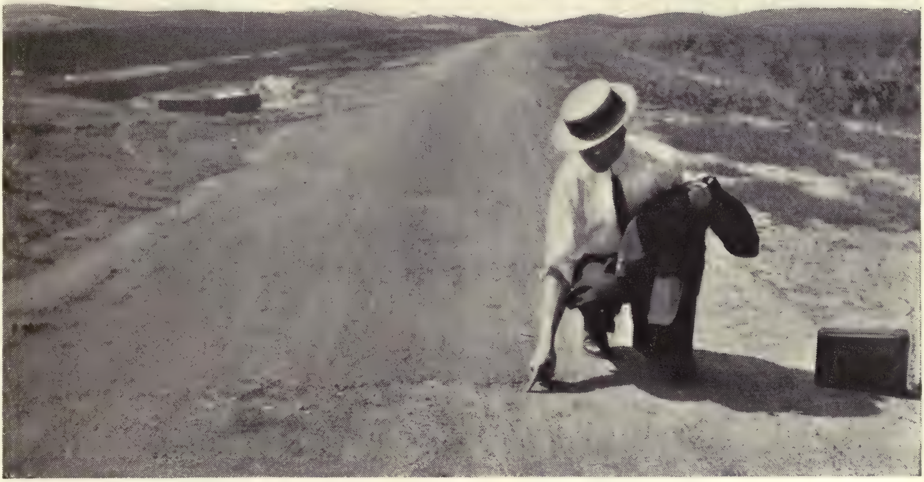

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The Old Way

The old way was to build a concrete base four or five inches thick, then add a bituminous wearing surface two to three inches in thickness to the concrete base, which wearing surface cost approximately twice as much as the concrete base.

The old way was to have an expensive paving plant for construction and to pay from two to two and one-half dollars per square yard for all bituminous pavements built on a concrete base.

The Dolarway

The Dolarway method is to build a concrete pavement five or six inches thick, then seal and waterproof the surface with Dolarway Wearing Surface, which is from one-eighth to one-quarter of an inch thick and costs considerably less than the concrete base.

The Dolarway construction requires no paving plant, and a handsome permanent noiseless pavement is obtained at a saving of from 50c. to $1.00 per square yard over prices paid for bituminous pavements built on a concrete base.

Dolarway is the ideal material to pave between and adjoining street car tracks. Dolarway meets all the requirements of a city pavement or a country highway where a permanent construction is desired. *Send for Booklet.*

DOLARWAY PAVING COMPANY

95 Liberty Street, New York.

Dolarway Pavement, Jefferson, Ohio.

300,000,000

Wire-Cut-Lug Blocks

No. 3074. Buffalo-Glenwood Road. 21 miles long. New York State Highway. Constructed June, 1911. Photo June 8, 1912, at Station No. 369. 13 miles from Buffalo City Line

Watch This List of Licensees Grow

During the year 1910	Corry Brick and Tile Co.	Corry, Pa.
	United Brick Co.	Conneaut, Ohio
During the year 1911	Kushequa Brick Co.	Kushequa, Pa.
	Sterling Brick Co.	Olean, N. Y.
	Reynoldsville Brick & Tile Co.	Reynoldsville, Pa.
	Danville Brick Co.	Danville, Ill.
	Paterson Clay Products Co.	Clearfield, Pa.
During 1912	Wabash Clay Co.	Veedersburg, Ind.
	Clinton Paving Brick Co.	Clinton, Ind.
	Alton Brick Co.	Alton, Ill.
	Deckman-Duty Brick Co.	Cleveland, Ohio
	Tuna Valley Pressed Brick Co.	Bradford, Pa.
	Foster Paving Block Co.	Bradford, Pa.
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	Bessemer Limestone Co.	Youngstown, Ohio
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The combined output of these companies is 300 million blocks annually, or enough to pave a sixteen-foot roadway 750 miles long. Hundreds of cities already have admitted Wire-Cut-Lug Block in their specifications and the number of city engineers recognizing their merit is growing. See that your specifications are right. Wire-Cut-Lug Block never have been rejected where submitted. *Write us for further evidence.*

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The Best for

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ANNUAL CAPACITY **1,000,000** BARRELS

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THE ALBANY POST ROAD

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ASPHALT BLOCKS have solved the ROAD PROBLEM on this very important highway as on many others

Read article on asphalt block, page 205

The Post Road was reconstructed and paved

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Keeps roads in good condition. In three grades, containing from 40 per cent. to 60 per cent. asphaltum.

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MADE FROM MEXICAN ASPHALT OILS

Both of these products are prepared ready for use without the addition of any flux

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STANDARD MIXING ASPHALT is especially adapted for mixed or Bituminous Concrete Pavements.

STANDARD PAVING ASPHALT, ready for use in sheet asphalt mixtures.

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		STANDARD MIXING ASPHALT	STANDARD PAVING ASPHALT
Penetration	32° F.	18	16
"	77° F.	62	52
"	115° F.	280	240
Ratio		1:3.4:15.5	1:3.2:15.0
Ductility at	77	80 Centimeters	80 Centimeters

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Made from Mexican Asphalt Oils

BINDER "A," for resurfacing worn out roads.

BINDERS "B" AND "C," for constructing Macadam Roads under the **PENETRATION METHOD.**

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U. S.
Wood Block Pavement

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A Wood Pavement That Lasted Thirty-Two Years

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Wood Block pavement is the only pavement of which this is true. Wood Block pavement is to be recommended wherever heavy traffic necessitates long-lived pavement.

Wood Block pavement is to be recommended for streets where quietness is desirable, as, for instance, in office-building districts, on residential streets and around hospitals, schools, courts, etc.

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September 27, 1912.

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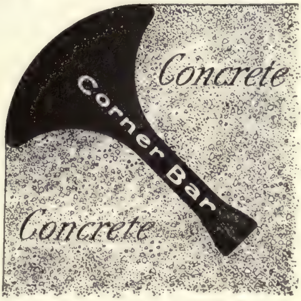

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	Ideal	Asphalt	Brick	Fibred-Asphalt
Cheapness	14	4	3	14
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Ease of Cleaning	15	15	12	14
Light Resistance to Traffic	15	15	12	15
Non-Slipperiness	7	3	6	7
Ease of Maintenance	10	6	6	10
Favorableness to Travel	5	5	4	5
Sanitariness	13	13	11	13
	100	76	67	97

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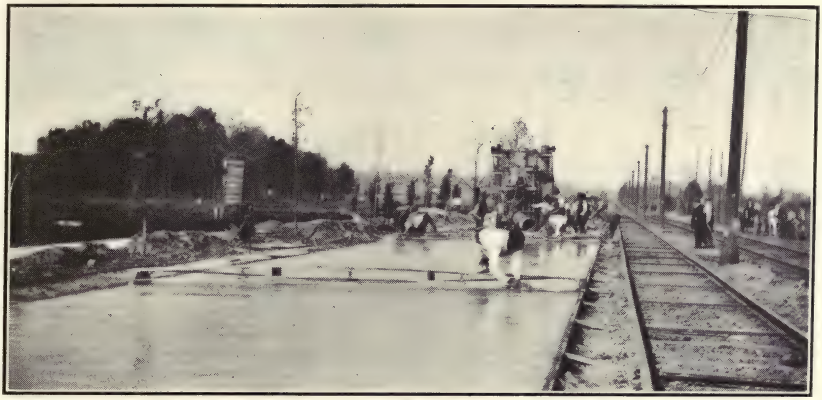

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BEST GRADES ASPHALT
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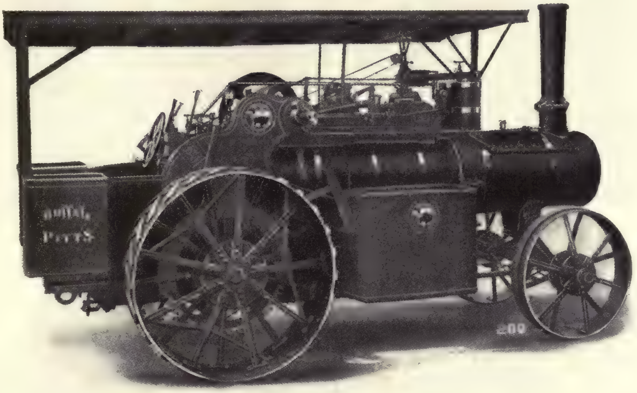

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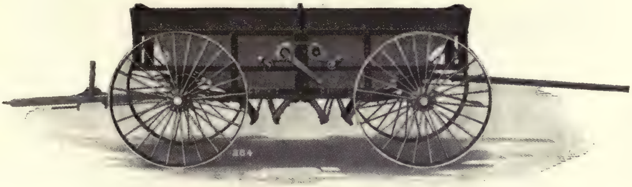

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Pulls loads with ease that engines of larger advertised ratings fail to budge.

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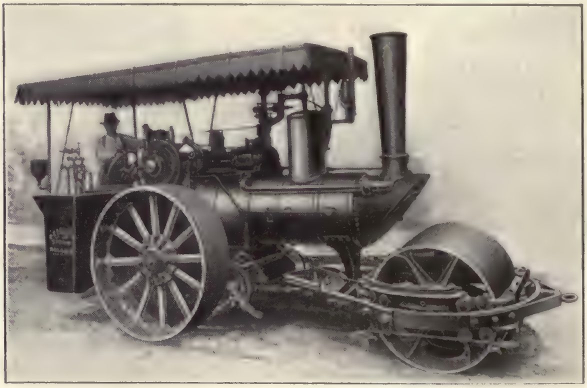

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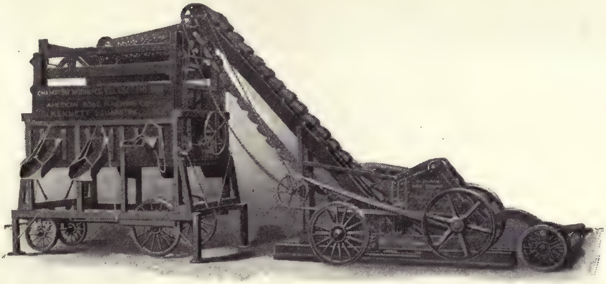

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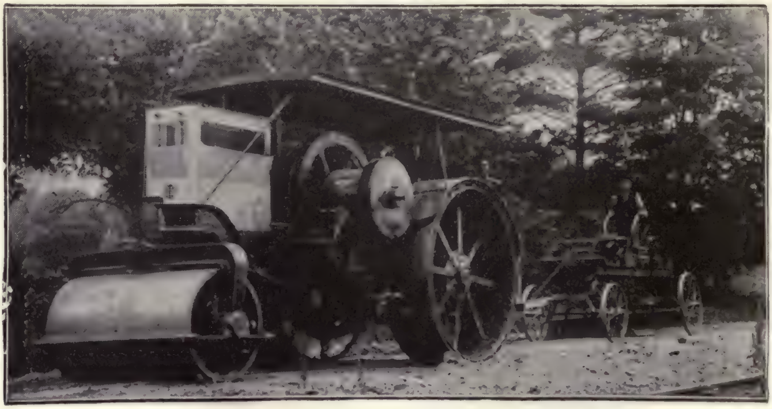
THE GOOD ROADS MACHINERY CO.

KENNETT SQUARE, PA.



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For Contractors' Use

Convertible—The I H C road-roller tractor is three machines in one; a road roller; a tractor to furnish power for grading machines; hauling stone and other material and to move the concrete mixer as required, and a portable engine to run the stone crusher or concrete mixer.

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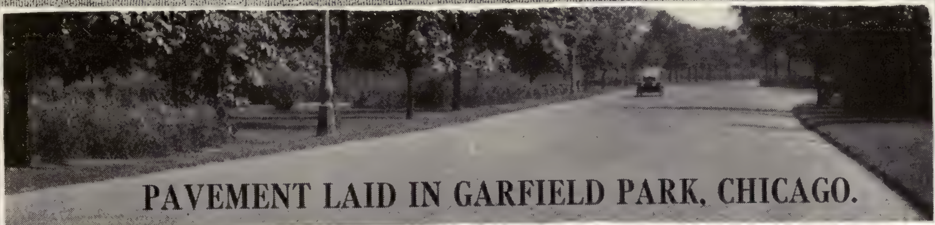

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LAID WITH THE 20th CENTURY PORTABLE ASPHALT PAVING PLANT

Insure Your Pavements

Against **cracks, ruts, soft spots** or **disintegration,** and make them **dustless,** by laying them with a

20th CENTURY PORTABLE ASPHALT PAVING PLANT

The **most economical** and **convenient** paving plant made, for large capacity or small. It is **really portable** and does **uniformly superior** work. **Proportions** of mixture positively maintained. **Temperature** absolutely under control. Mixture **delivered fresh** in best possible condition for **permanently satisfactory** results.

Particulars upon request—
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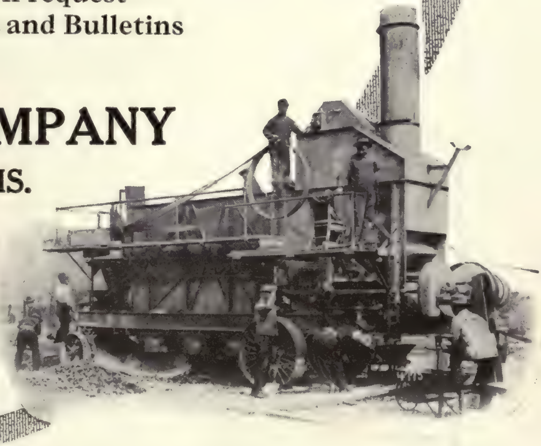


LINK-BELT COMPANY
CHICAGO, ILLINOIS.

Manufacturing and Selling under license from the Twentieth Century Portable Paving Machine Co.

MILWAUKEE Concrete-Mixer

MR. CONTRACTOR:
IF YOU EXPECT TO COMPETE WITH YOUR COMPETITOR YOU *MUST* HAVE A MILWAUKEE

ORDER EARLY AS WE ARE RUNNING OUR FACTORY NIGHT AND DAY TO SUPPLY THE DEMAND.

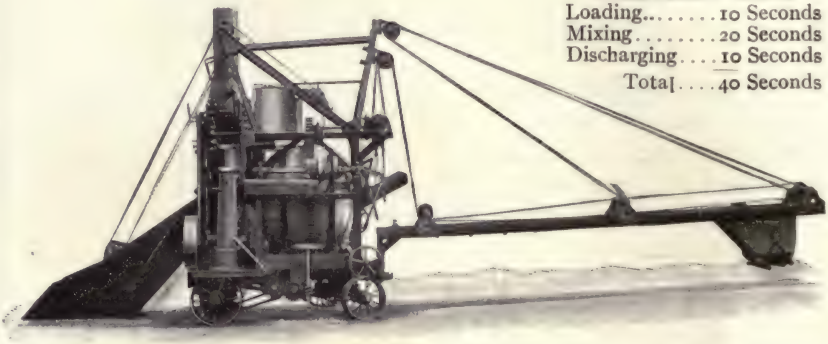
ROSEBERRY SAYS:
IT MEANS A
MILWAUKEE-IN-THE-END
WHY NOT NOW?

Representatives Everywhere

Write for Catalague

A Milwaukee Record

Loading........	10 Seconds
Mixing.........	20 Seconds
Discharging....	10 Seconds
Total....	40 Seconds



Milwaukee Street Paving Machine

EQUIPPED WITH BOOM AND TRACTION DRIVE IN BOTH DIRECTIONS
ALSO POWER STEERING ATTACHMENT

MADE IN THREE SIZES AS FOLLOWS:

No. 9, 8 cu. ft. loose material, 6 cu. ft. mixed material.

No. 14, 14 cu. ft. loose material, 12 cu. ft. mixed material.

No. 20, 20 cu. ft. loose material, 18 cu. ft. mixed material.

Boom 20 ft. long, and bucket will carry the full batch of mixer.

Milwaukee Concrete Mixer & Machinery Co., MILWAUKEE WIS., U. S. A.

BLYSTONE BATCH MIXER

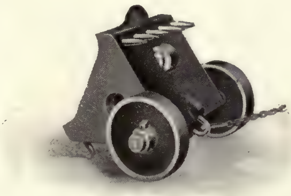
Consider What These Points Mean to You on Curb and Sidewalk Work.

1. All open and material in full view while mixing. No errors in wetting.
2. Filled and dumped while in motion. Two turns of the crank handle dump it.
3. No cumbersome attachments to eat up power and get out out of order.
4. Does not tumble the material around, but MIXES it. Batch is shoveled over 40 times a minute; lengthwise and up and down.
5. Capacity ½ cubic yard per batch per minute; 85 cu. yds. per day.

Our Catalogue tells all about it.

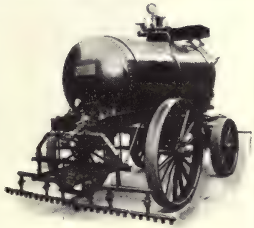
BLYSTONE MACHINERY CO.

94 Scott Street **CAMBRIDGE SPRINGS, PA.**



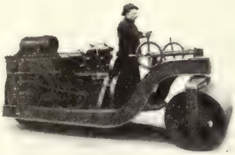
Scarifier—Front View

Heating Kettles—all sizes



Pillsbury Distributor

Sand Spreader



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No. 1-A Street Sweeper

Scrubber with Fibre or Rubber Broom

Manufacturers of

Road Making and Street Cleaning Machinery and Implements,

CHAS. HVASS & CO.

East 18th to 19th Streets, Aves. A and B **NEW YORK CITY**

Attention!

Would you build bituminous macadam roads by the cheapest and best methods

The Answer

Use "TARCO" Welded Appliances

Hand Pouring Pots **Brick Filling Pots** **Carrying Pots**
Conveying Spouts **Tank Car Platforms**
Heating Kettles **Pumps**

For sale by the best dealers everywhere

Tarrant Manufacturing Co.
12 Maple Ave.
Saratoga Springs, N. Y.

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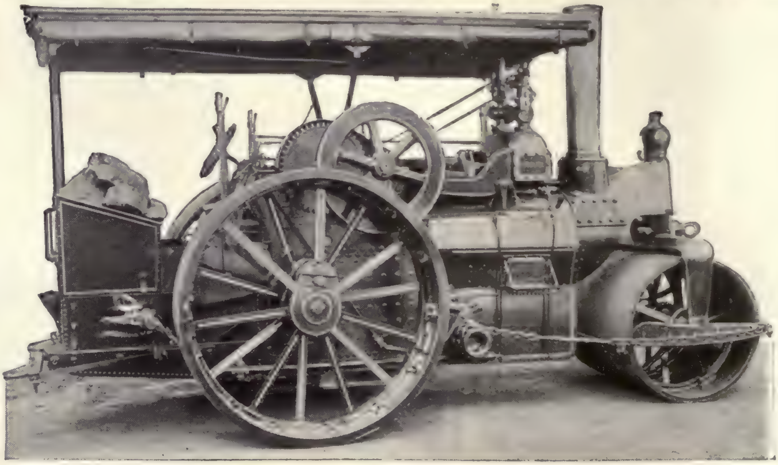
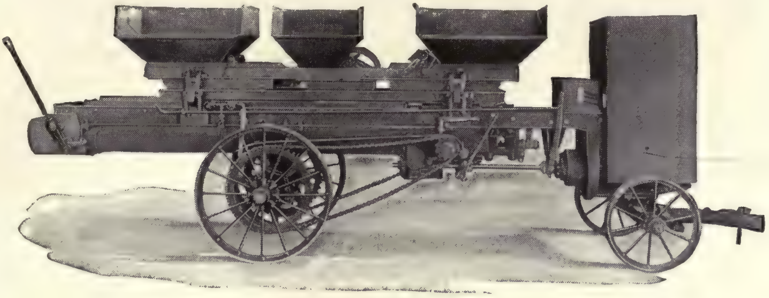


Tandem and macadam rollers, asphalt and concrete mixers, heating kettles, fire wagons, surface heaters, melting pots, etc., etc. Send for catalogues.

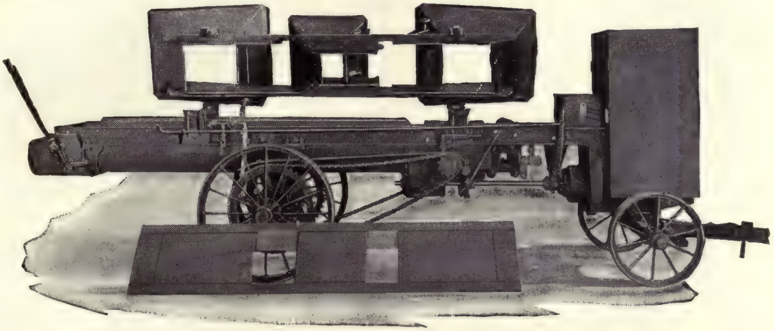
BUFFALO, NEW YORK **Sales Offices in Principal Cities**

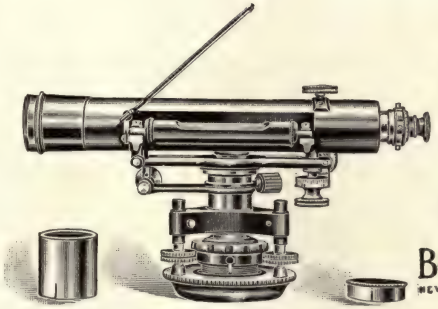


"Kent" Precision Mixers produce concrete of the highest quality at the lowest possible cost. They are the most economical mixers made for curb and gutter, street paving, highway bridges, etc.

The illustration shows the 1913 model with roll over hoppers, removable feed plate, reversible mixing shaft spur gear drive, also with traction operating in either direction. **THE LAST WORD IN CONCRETE MIXERS.**

Write for Catalog, giving full information to **THE KENT MACHINE COMPANY,** 316 North Water Street, Kent, Ohio.





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and original ideas characterize **Bausch & Lomb Engineering instruments**—new models render line unusually comprehensive.

Send for **new complete catalog** of exceptional interest.

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Fairmont, W. Va.
Fairmont Paving Blocks

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PAVING BRICK COMPANY
Mfrs. of
"Best Paving Brick Made"
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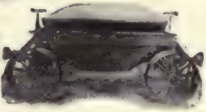
THE THORNTON FIRE BRICK COMPANY
MANUFACTURERS OF
"GRAFTON" PAVING BLOCK
THE BEST
Made from Shale Vitrified
Quality, Quantity and Prompt Service
General Office: Clarksburg, W. Va.

New York-Port Huron "Standard" Road Roller

Port Huron General Purpose Road Roller



All-Steel Hand Steering Reversible Spreading and Dump Car

All-Steel Spreading and Dump Car

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Port Huron Engine & Thresher Co.
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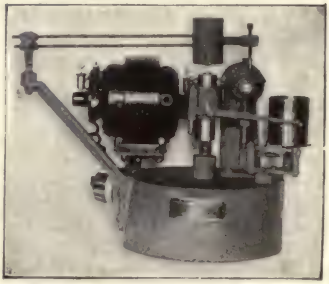
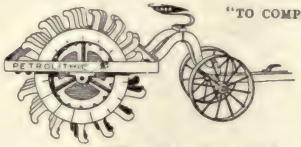
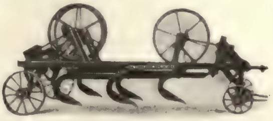


Highway Laboratory Apparatus
Diamond Core Drill
Diamond Saw
Ball Mill
Abrasion Machine
Toughness Impact Machine
Dorry Hardness Tester
International Instrument Co.
CAMBRIDGE, MASS.

Road Materials Testing Machines
also
Complete Laboratory Equipment
for testing
Cement, Concrete, Iron, Steel, etc.
Write for full Information
Tinius Olsen Testing Machine Co.
500 North 12th Street
Philadelphia, Pa.



"TO COMPACT"
SOME "Whys" in Petrolithic Methods
WRITE
THE PETROLITHIC CO.
LOS ANGELES, CAL.
"TO SCARIFY"



HIGHWAY BRIDGES AND CULVERTS

The proper material to be used in the construction of a bridge or culvert depends almost wholly on local conditions, such as area of waterway required, character and amount of traffic, available funds, etc. For bridges of considerable span, steel is commonly used, though long arches of concrete, stone or brick are not unusual. For the shorter spans up to 30 or 40 feet, reinforced concrete is well adapted. Culverts are built of various materials, such as stone, brick, concrete, and pipe of cement, vitrified clay, corrugated iron, or cast iron. Wood is also frequently used, but the high cost of maintenance, and the inconvenience and discomforts attending periodic repairs or renewals make it a very undesirable material of which to construct highway bridges or culverts, and its use should be avoided.

Steel Bridges

Because of its toughness and great unit strength, steel is peculiarly well adapted for use in bridge construction. Cast and wrought iron were formerly much used for this purpose, but in recent years have been generally supplanted by steel.

A complete discussion of the subject of steel bridges would occupy too much space to be undertaken here. There are a few essential details, however, which may be profitably pointed out.

Design

The design of steel bridges is now almost an exact science, and most of the bridge companies doing business in this country are amply equipped for executing designs under any reasonable set of conditions that may be imposed. It is obviously bad practice, however, to invite bids for furnishing and erecting a proposed bridge from these companies upon their own plans, without first having prescribed a complete and definite set of conditions to which the designs must conform. Otherwise, in the absence of a standard of excellence, no adequate comparison can be made of the bids received. Also, irresponsible parties are likely to secure the contract by submitting low bids with very light designs. Provision should always be made for having bridge designs checked by a competent, disinterested designer.

Loading

The loading which a highway bridge should be designed to sustain depends in general on the local traffic conditions. Due allowance, however, should always be made for reasonable increases both in the amount of traffic and in the weight of concentrated loads. For rural bridges it is usually sufficient, in designing the floor system, to provide for a uniform live load of 125 pounds per square foot, or for a load of 20 tons concentrated on two axles 10 feet apart, with wheels spaced 6 feet on axles and with two-thirds of the load on the rear axle. In designing the trusses the uniform live load may be safely assumed as follows: For spans less than 50 feet in length, 125 pounds per square foot of floor surface; for spans between 50 and 100 feet in length, 100 pounds per square foot of floor surface; while for spans greater than 100 feet in length, the assumed uniform live load per square foot of floor surface may be reduced 2 pounds for each additional 10 feet in length of span, provided that in no case should the assumed uniform live load be less than 80 pounds per square foot of floor surface.

Piers and Abutments

A large percentage of the bridge failures in this country have been due to umproperly designed abutments. There seems to be a general tendency to confuse the design of abutments with that of piers, and it is not unusual to see a bridge, consisting of a single span, supported on four slender cylindrical piers with no other provision for restraining the material of the approach embankment than wooden boards resting against these piers. There can be no objection to the use of properly designed cylindrical piers for supporting intermediate spans; but the abutment must serve a dual purpose. It is required to support the bridge and also to act as a retaining wall for the approach; and both of these functions should be considered in making the design.

Foundations for Piers and Abutments

In designing piers and abutments, the size of the footings should usually depend on the character of the foundation material. Investigations should, therefore, be made in the vicinity of each pier or abutment before the design is completed. The foundation may be tested by sounding with rods, by boring with wood augers, by sinking pipes with water jets or by drilling with a percussion drill.

When the character of the foundation material has been determined, its safe bearing capacity may be estimated from the following table, taken from U. S. Office of Public Roads Bulletin No. 43.

Material	Bearing power (tons per square foot)
Quicksand and wet soils	0.05 to 1
Dry earth	1 to 1.5
Moderately dry clay	2 to 4
Dry, stiff clay	4 to 6
Sand	2 to 4
Sand, compact and cemented	4 to 6
Gravel, cemented	8 to 10
Rock	200

Where the material of the foundation is poor, as, for example, wet clay or quicksand, it is customary to increase its bearing power by making use of piles, which are driven to such depth as is necessary to prevent settling after the weight of the whole structure is superimposed, the piles being considered as carrying the entire load. The formula in most general use for determining the amount of driving necessary to produce this condition is that proposed by the *Engineering News*, $P=\frac{2WH}{S+}$, in which P is the safe load in pounds on one pile, W the weight of the hammer in pounds, H the fall of the hammer in feet, and S the penetration or sinking in inches under the last blow.

Floors

Highway bridge floors are made of wood, reinforced concrete or steel. Wood floors are probably the most common, but reinforced concrete presents many advantages over wood for this purpose, and is becoming very popular. Wood floors on old bridges, however, should never be replaced by concrete, unless the change was anticipated in the original design. Neither should the thickness of the wood floor be much increased, as any additional weight put on the structure for which provision has not been made is likely to prove disastrous.

The economical thickness of wood floors depends on traffic and climatic conditions, as well as on the quality of the wood. In general, it should be such that the wood will have practically worn out before being destroyed by decay. This economical thickness varies from 2½ to 4 inches.

Concrete or steel floors should always be protected from the traffic by cushion of earth or macadam.

Painting

Steel bridges should ordinarily be repainted about once every three years. If this work is neglected, as is so frequently the case, rust soon makes inroads into the metal, impairing both its strength and appearance.

Concrete Bridges and Culverts

Concrete bridges and culverts should be designed to sustain the same live loads as those indicated above for steel bridges.

The proper type of superstructure to adopt for any particular case should usually depend on local conditions. For example, where sufficient head room and satisfactory foundation can be obtained, an arch may be advantageously used. Where head room is limited or the foundation poor, however, it may frequently be necessary to make the superstructure flat. Also, flat slab superstructures are ordinarily used for spans less than about 14 feet in length, as little, if any, saving can be effected by using an arch. Where appearances are of prime consideration, however, an arch may properly be used, even at additional cost.

There are three types of flat reinforced concrete superstructures in general use which are respectively known as the slab type, the encased I-beam type, and the T-beam type. Each of these types may be used with either stone or concrete abutments.

The slab type is practicable only for spans less than about 16 feet in length. Culverts and bridges of this type are very easily constructed, and require very little skilled labor.

The encased I-beam type of superstructure is well suited for spans from 10 feet to 30 feet in length. In this type, the steel beams are designed to carry the entire load, though the concrete casing undoubtedly increases the strength of the structure.

The T-beam type is adapted for about the same range of spans as the I-beam type, though T-beams can be used for somewhat longer spans. When used for spans over 30 feet in length, however, the economy of employing them should be demonstrated for each particular case. The construction of T-beam bridges and culverts is more difficult than either of the other types and requires more skilled labor. The cost of materials, however, is, in general, somewhat less.

The accompanying illustrations, which have been prepared from data contained in Bulletin No. 45 of the U. S. Office of Public Roads, show how the various types of concrete superstructures are designed, and also show typical designs for a 4 foot by 3 foot box culvert, and a 10 foot span slab bridge on stone abutments.

Specifications for reinforced concrete bridge and culvert construction are contained in U. S. Office of Public Roads Bulletin No. 45, which may be had upon application to the Director of that office.

Pipe Culverts

Vitrified clay, cast iron, corrugated iron, steel plate and cement pipes are used for the smaller culverts. Up to 24 inches in diameter pipe culverts are usually economical and the pipes are easily handled and laid. They should be laid true to grade and on a firm foundation. Headwalls of concrete, brick or stone should be constructed at each end, extending high enough to carry the fill and low enough to avoid damage by frost.

Cast Iron Pipe Culverts

Cast iron pipe has been satisfactorily used for culverts for many years, and while not as cheap per foot, nor as easily handled as some of the lighter metal culverts, its claim to durability can not be questioned. Some of the cast iron pipe culverts placed in Paris over three hundred years ago are still in service and apparently in a fair state of preservation.

Cast iron pipe for highway culverts is usually made in 12-foot lengths, and can be obtained in various diameters from foundries in almost every part of the country.

Corrugated Iron Pipe

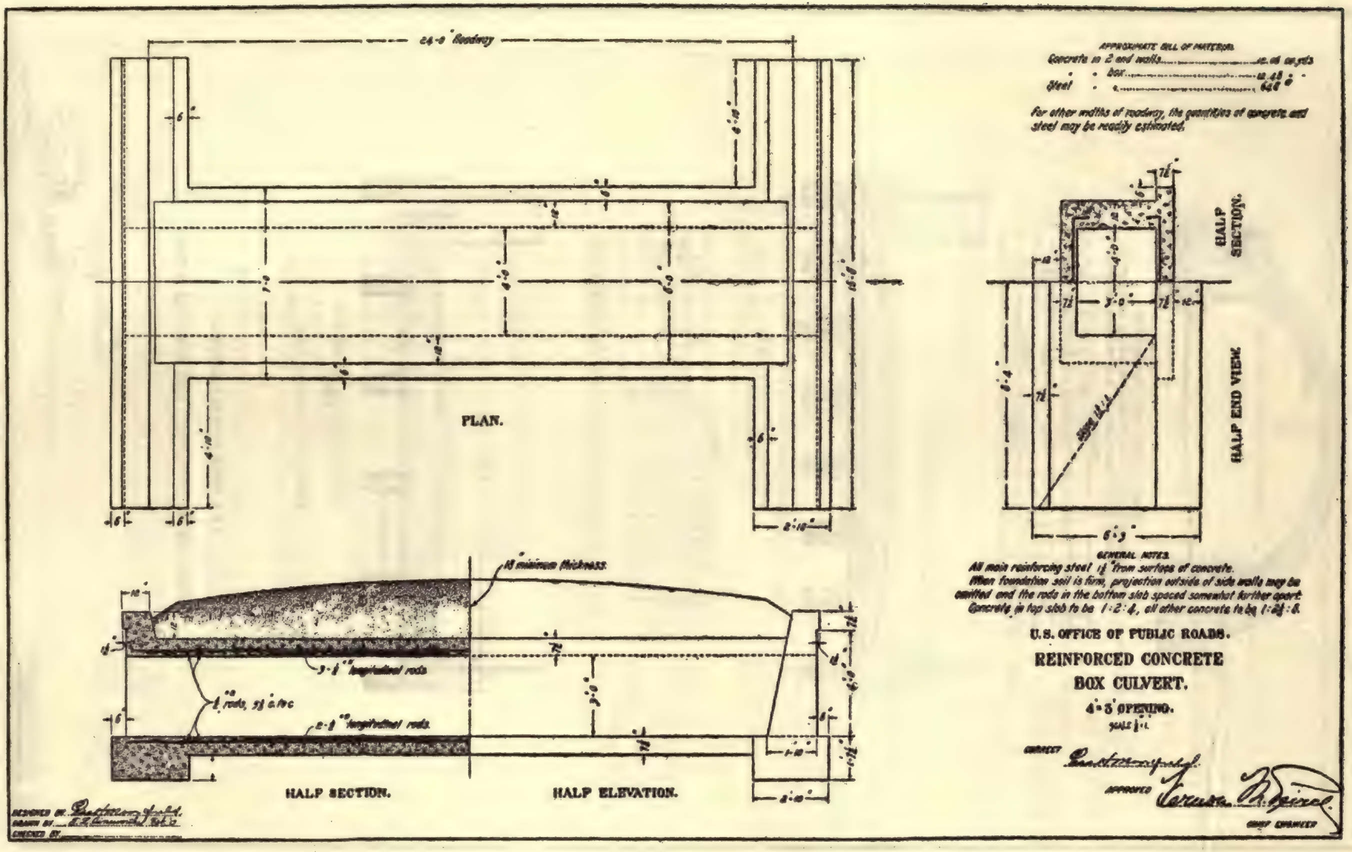
Corrugated pipe, made of pure iron has been on the market for only a comparatively short time, but promises to prove a valuable addition to the list of culvert materials. The corrugations enable the required strength to be obtained with very thin metal, and it is claimed that the pure iron of which the pipe is made offers superior resistance to corrosion. Acid tests seem to bear out this claim, but time alone can furnish the real test of usage.

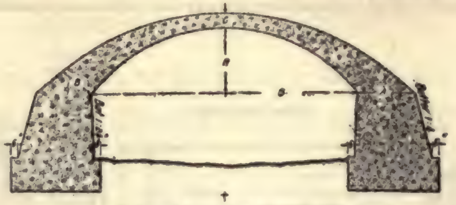
Vitrified Clay Culvert Pipe

In localities where the ground does not freeze to great depths, vitrified clay pipe has proved satisfactory as a culvert material. It should be double strength, hard burned, and salt glazed. Each pipe should be a true cylinder, free from cracks, and have a thickness of shell of at least one-twelfth of the internal diameter. In laying the culvert, care should be taken to round out the bottom of the ditch to fit the pipe, making suitable depressions for the bells. Where rock occurs in the ditch, it should be excavated some 6 inches below the lower surface of the pipe and replaced with clay or sand. In very cold climates, the pipe should be completely covered with sand or broken stone for a depth of at least 6 inches. Where earth comes directly in contact with the pipe, danger from freezing is considerably increased. The surface of the roadway should never be less than 1½ diameters above the top surface of the pipe.

Importance of Engineering Supervision

Before leaving the subject of bridges and culverts, attention should be called to the importance of having the design and construction of all such structures executed under the immediate supervision of a competent engineer. In no other feature of highway improvement can technical training be employed to better advantage. Not only the efficiency of the structure itself is involved, but human safety is not infrequently dependent on its proper design and construction.

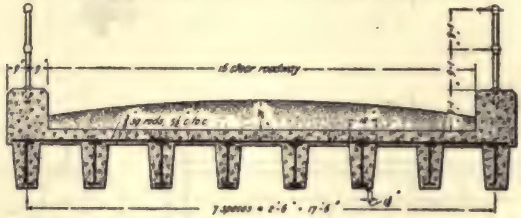
24'-0" Roadway
PLAN.
HALF SECTION.
HALF ELEVATION.
HALF SECTION.
HALF END VIEW.
18" minimum thickness.
3-⅜" longitudinal rods
2-⅜" longitudinal rods
⅜" rods, 9⅜" c. to c.
APPROXIMATE BILL OF MATERIAL
Concrete in 2 end walls .... 12.06 cu. yds
" " box .... 12.48 " "
Steel " .... 648 #
For other widths of roadway, the quantities of concrete and steel may be readily estimated.
GENERAL NOTES.
All main reinforcing steel 1½" from surface of concrete.
When foundation soil is firm, projection outside of side walls may be omitted and the rods in the bottom slab spaced somewhat farther apart.
Concrete in top slab to be 1:2:4, all other concrete to be 1:2½:5.
U.S. OFFICE OF PUBLIC ROADS.
REINFORCED CONCRETE
BOX CULVERT.
4'×3' OPENING.
SCALE ⅜"=1'
CORRECT
APPROVED
CHIEF ENGINEER
DESIGNED BY
DRAWN BY
CHECKED BY
6'-3"
8'-4"
2'-10"
4'-10"
7'-0"
4'-0"
6'-0"
3'-0"
16'-8"
7½"
6"
12"
10"



TYPICAL SECTION PLAIN CONCRETE ARCH.
Concrete in superstructure 1 : 2 : 4. In abutments and wing walls 1 : 2½ : 5.
For intermediate spans, the dimensions may be obtained by interpolation.

DIMENSIONS

Span = S	R	C	B	A
4'-0"	2'-0"	0'-5"	1'-0"	1'-0"
12'-0"	3'-0"	0'-9"	1'-11"	3'-6"
20'-0"	5'-0"	1'-1"	2'-9"	5'-3"
30'-0"	7'-6"	1'-6"	3'-9"	6'-0"

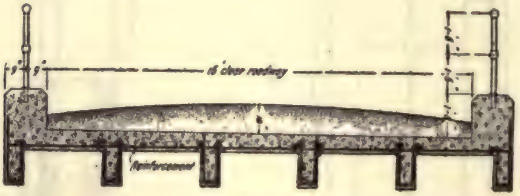


TYPICAL SECTION ENCASED I-BEAM BRIDGE.

DIMENSIONS

Span	Std I	Span	Std I	Span	Std I
10'	8"-18 lb	18'	10"-31½ lb	26'	18"-55 lb
12'	9"-21 lb	20'	15"-42 lb	28'	18"-55 lb
14'	10"-25 lb	22'	15"-42 lb	30'	18"-55 lb
16'	12"-31½ lb	24'	15"-42 lb		

Side channels to be the lightest standard channels of the depth specified for the I's.
Concrete in superstructure to be 1 : 2 : 4



TYPICAL SECTION REINFORCED CONCRETE T-BEAM BRIDGE.

Concrete in superstructure to be 1 : 2 : 4.

U. S. OFFICE OF PUBLIC ROADS.

TYPICAL SECTIONS FOR SHORT SPAN CONCRETE BRIDGES.

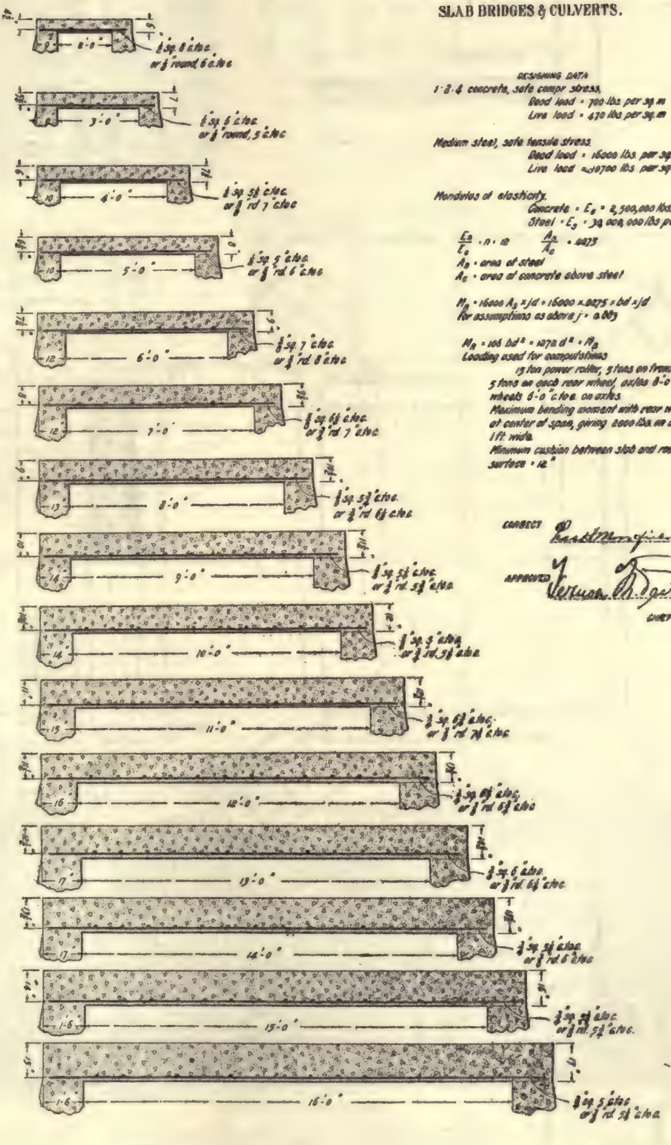
CORRECT

APPROVED Vernon M. Peirce
CHIEF ENGINEER

DRAWN BY
TRACED BY

U. S. OFFICE OF PUBLIC ROADS.

TYPICAL SECTIONS FOR REINFORCED CONCRETE SLAB BRIDGES & CULVERTS.



DESIGNING DATA

1·2·4 concrete, safe compr stress,
Dead load = 700 lbs per sq. in
Live load = 470 lbs per sq. in

Medium steel, safe tensile stress,
Dead load = 16000 lbs. per sq. in.
Live load = 10700 lbs. per sq. in

Modulus of elasticity,
Concrete = E_c = 2,500,000 lbs. per sq. in
Steel = E_s = 30,000,000 lbs per sq. in

$\frac{E_s}{E_c} = n = 12$ $\quad \frac{A_s}{A_c} = .0075$

A_s = area of steel

A_c = area of concrete above steel

$M_s = 16000\,A_s \times jd = 16000 \times .0075 \times bd \times jd$

For assumptions as above $j = 0.883$

$M_s = 106\,bd^2 = 1272\,d^2 = M_s$

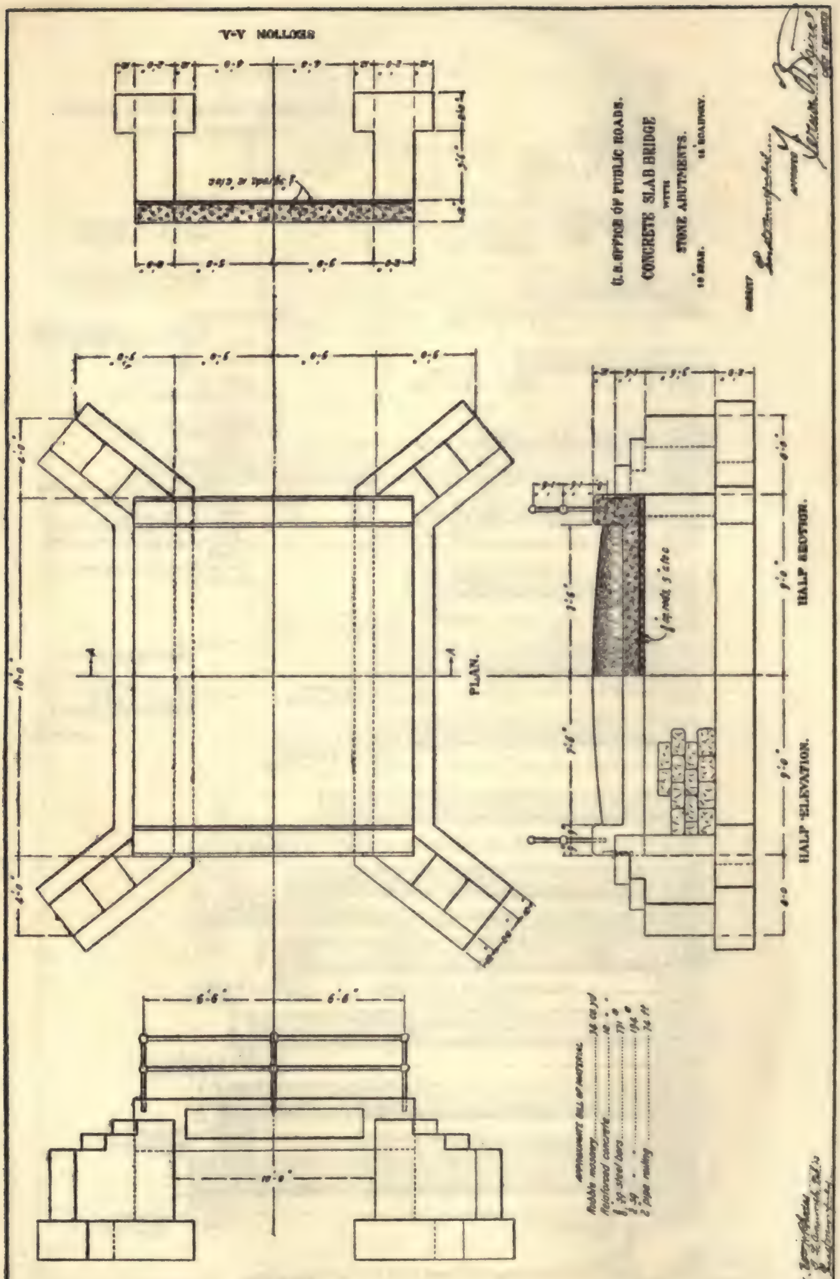
Loading used for computations
15 ton power roller, 5 tons on front wheel, 5 tons on each rear wheel, axles 8'-0" c. to c., wheels 6'-0" c. to c. on axles.
Maximum bending moment with rear wheels at center of span, giving 8000 lbs. on a strip 1 ft. wide.
Minimum cushion between slab and road surface = 12"

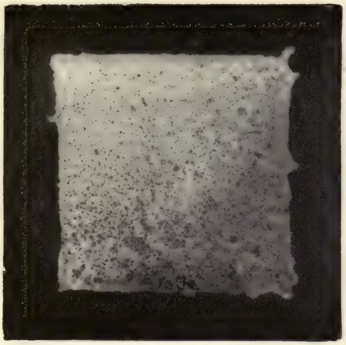
CORRECT

APPROVED Vernon M. Peirce
CHIEF ENGINEER

Note:
All longitudinal rods ½" sq. spaced 12" c. to c. or ½ round spaced 10" c. to c.

DRAWN BY L. L. W. Feb '13
TRACED BY T. T. Ainsworth, Feb. '13

SECTION A-A
PLAN.
HALF ELEVATION.
HALF SECTION.
END VIEW
U.S. OFFICE OF PUBLIC ROADS.
CONCRETE SLAB BRIDGE
WITH
STONE ABUTMENTS.
10' SPAN.
16' ROADWAY.
APPROXIMATE BILL OF MATERIAL
Rubble masonry 34 cu yd
Reinforced concrete 10 "
5/8 sq steel bars 771 #
1/2 sq " 194 "
2 pipe railing 74 ft
DESIGNED BY
DRAWN BY
CHECKED BY
6'-6"
10'-0"
18'-0"
9'-0"
4'-0"
9'-6"



An Extreme Test

THE above illustration represents a photographic reproduction of the result obtained when a piece of sheet iron coated with Glidden's Acid Proof Coating (leaving the center of one side unprotected or exposed) was submitted to a bath of 30% Nitric Acid. At the expiration of an hour and forty minutes, the entire unprotected portion was completely consumed by the acid, leaving a strong, firm film of Acid Proof Coating which had not deteriorated in the least.

FOR

HIGHWAY BRIDGES

GLIDDEN'S

White or Gray Acid Proof Coating

Lights the Way

WEARS LIKE IRON

Outwears Paint and affords maximum protection to Steel Bridges.

A film of this wonderful material together with detailed information will be sent upon request to those engaged in highway maintenance.

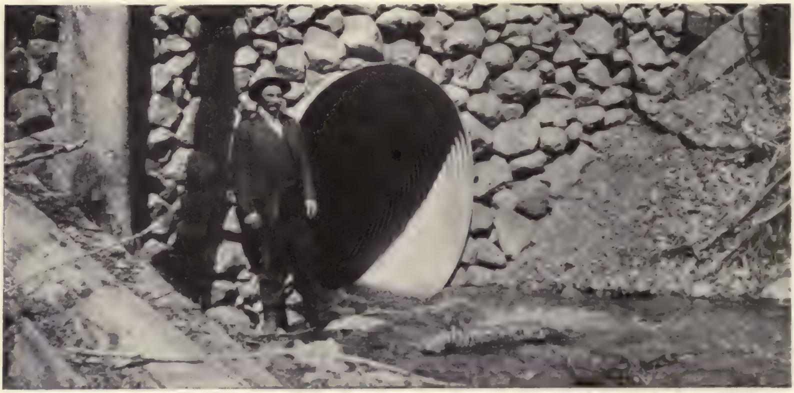
THE GLIDDEN VARNISH CO.

Factories: Cleveland, Ohio, Toronto, Canada

Branches: New York, Chicago, London

LUTEN DESIGN

CULVERT ECONOMY



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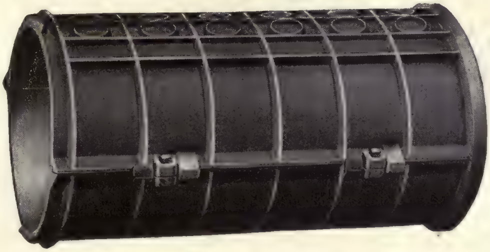

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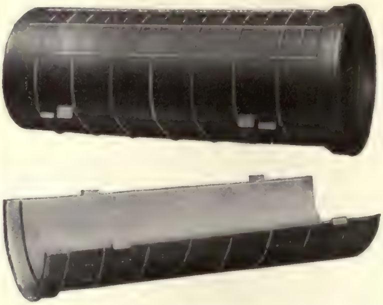

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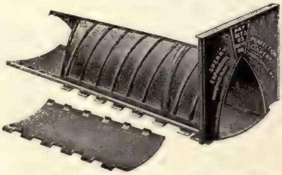

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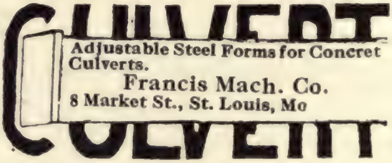

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ROAD MAINTENANCE AND REPAIR

Repairs of all kinds of roads should take place before maintenance charges are begun. Too often the terms maintenance and repair are confused. If the maintenance of a road is neglected, it will be necessary eventually to repair it. A well maintained road, on the other hand, may never require repair.

The repair of earth and gravel roads usually involves reshaping and drainage and the subsequent betterment of the road surface. Special items of repair are replacing culverts, refilling washed portions of the road, excavating new ditches, etc. The repair of gravel and earth roads is well explained in the article on construction of the same.

To distinguish the repair of macadam roads from the maintenance of the same, the word repair may be restricted to those operations commonly called resurfacing. When an old macadam is worn so thin or becomes so full of chuck holes that its life is endangered, it is usually resurfaced; the period is about 6.5 years. It is becoming increasingly common to resurface macadam roads with some form of bituminous construction. If the old macadam surface is first scarified or picked up with the roller or hand labor, and considerable new stone added the repair operations go forward from this point as in bituminous macadam construction. When no bituminous material is used in macadam road repairs, the surface stone is brought to true crown and thoroughly rolled and bonded as in ordinary macadam road construction. There is considerable variation in the method and amount of scarifying or loosening of the old macadam surface; e.g., if a macadam road has simply developed a horse track or worn travelled way for a width of 6 to 8 feet in the center, the road is sometimes repaired by thoroughly sweeping and adding sufficient new stone to restore the crown without scarifying. Sometimes the edges only of a macadam roadway are scarified or picked to insure a bond of new stone with the old road course. Scarifying or picking up of the old road surface may be entirely omitted and new stone put in place without disturbing the road crust. This should never be done without first thoroughly scouring the old surface with stiff brooms and flushing with hose, if possible, otherwise a dust layer will be present and no bond develops between the new and old material. Of course, if a hose cannot be had, thorough dousing with a sprinkling cart will suffice.

Many macadam roads are now repaired by what is known as surface treatment. This is essentially a modified form of bituminous construction by the penetration method. A typical example of this process is as follows: The old road is thoroughly cleaned of all dust and refuse; and application of bituminous material is made on the road of ¼ gallon to the square yard followed by a uniform coating of screenings or fines, preferably of screened trap rock. These screenings should not exceed ½ inch in greatest diameter. If ruts or holes are present, they may be brought up to a true surface with screenings. The road is now rolled; another application of ¼ gallon to the square yard of bituminous material is made and the second course of screenings applied. Such depressions as developed are of course filled with screenings as the work proceeds and a sufficient excess of bituminous material should be given to such spots. A supply of surface screenings should be left along the road when such repair methods are used so that they may be spread subsequently to take up any excess of bituminous material that develops on the surface.

Maintenance

Undoubtedly the best system of maintenance for all roads is that which provides for the permanent and sometimes continuous employment of skilled laborers who have charge of particular sections of road, or who may be assigned to any part of the county or other road unit where there is work most needed. Men employed in this way become experts in their particular line and if they make mistakes one year or in one place, they are apt to correct them but, under the labor tax system, mistakes are often repeated. If one man is employed to look after a particular stretch of road, he will learn to take pride and interest in his work.

The continuous maintenance system has been adopted in this country only to a limited extent. It has been used by the Massachusetts highway commission for several years. The New York State highway commission introduced it in the year 1910 for the maintenance of State roads, and Allegheny County, Pennsylvania, employs it for the maintenance of about 100 miles of county roads. The office of Public Roads has also determined its effectiveness on experimental stretches.

While it would be manifestly impossible to adopt the continuous maintenance system throughout the country on account of limited resources, and sparse population, still there are many places where it might be used with success. It would be difficult to find a county which is so poor that it could not afford to employ continuously eight or ten laborers and three or four teams to maintain and repair its roads. That such a plan would be more effective than the labor tax system has been often proved.

Of all our roads, the earth roads are probably the most neglected. The first and last principle in the maintenance of earth roads is to keep the road well drained. Water is the great enemy to our clay or soil roads, and must be removed immediately, or mud results. To insure good drainage, the ditches must be free and the smooth crown of the road maintained. For this purpose the split-log drag, or an equivalent drag is very useful and, at the same time, inexpensive. The drag can be used on a sand-clay road or gravel road with good effect.

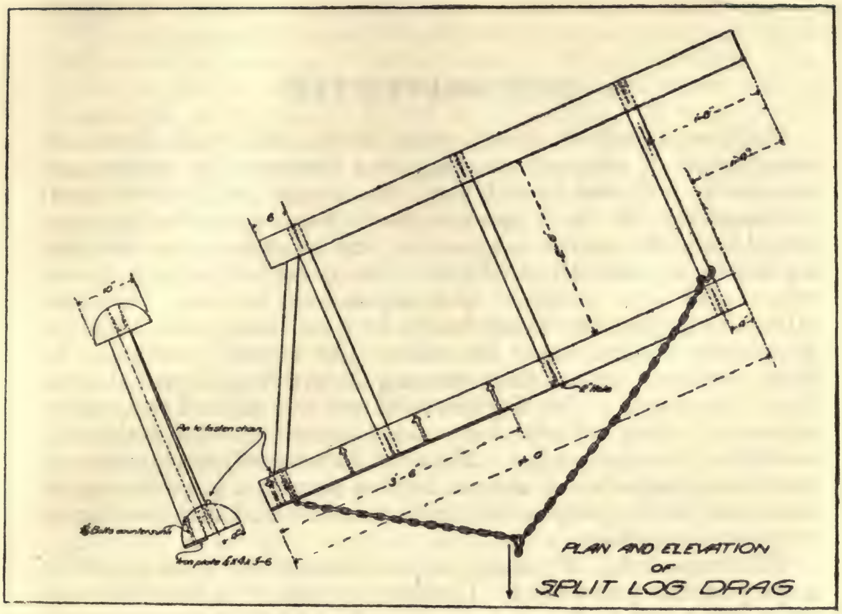
The following points govern dragging on earth, gravel or sand-clay roads: The drag should be light, and should be hauled over the road at an angle of about 45 degrees so that only a small amount of earth is pushed to the center of the road. The driver should ride on the drag and not drive faster than a walk. Some men like to weight the drag and direct it by handles arranged like plow handles. Dragging should begin on the side of the road, or wheel track and return on the opposite side. Unless a road is already in good condition, it should be dragged after every heavy rain, when the mud will puddle well, and still not adhere to the drag. A few trips over the road will give the operator a clue as to the proper and best time to drag. If a road is dragged immediately before a cold spell, it will freeze smooth.

Always drag a little earth toward the center to keep the slope of the crown about an inch to the foot. If the drag cuts too much, shorten the hitch or change your position on the drag. The results from dragging are obtained only by repeated applications. A good system of dragging is that which is practiced in Kansas and Iowa, where road authorities are authorized to let contracts to farmers for dragging the roads abutting their lands. The cost of dragging will be for from $.75 to $1.25 per mile per complete dragging of several trips. The cost will depend on the width and price of teams. From 15 to 30 draggings should be given a road the first year.

With reference to the maintenance of macadam roads, it is pertinent to state at the outset that it is doubtful practice now to patch macadam roads without using some form of artificial binder. A few automobiles a day passing a well made patch will frequently destroy it. There are, however, roads where a strictly macadam surface must be maintained. In repairing such roads, the stones should be applied only after the depressions have been thoroughly cleaned with stiff brooms and it is desirable to pick the edges with hand picks. The stones should be thoroughly rammed and bound with fines. An essential feature of all stone road repair is to have a supply of stone and binding material at frequent intervals, not less than 100 tons to the mile. Do not attempt to patch a road with stone greater than 1¼ inches in longest dimensions and use clean screenings. Road sweepings or organic matter and rubbish must never be used to bond stone patches. The maintenance of all kinds of macadam roads will be more effective if such roads are rolled in the spring with a steam roller when the frost has left the ground.

Where a patrolman has charge of waterbound macadam roads, he should take advantage of all wet weather to discover depressions in the road and to improve drainage. A patrolman should also remove all loose stones as they are particularly injurious to automobile tires and to the road used by automobiles. Such stones should be collected in piles of sufficient size so that no stone is wasted. An important item of maintenance of macadam roads is the paring of the shoulders and attention to weeds and sod which encroach on the roadway. If a road has been lined and graded it should be possible to cut weeds and grass on the shoulders with a mowing machine.

The importance of all forms of maintenance on roads is becoming more clearly recognised. It is an administrative problem. Where good business management is introduced, success follows. It is quite possible that extensive modern roads can be absolutely maintained for an indefinite period if they are given the proper surface treatment at necessary intervals. Frequently, however, even the best constructed road depreciates and ultimately requires rebuilding, because of the failure to properly systematize the maintenance.



PLAN AND ELEVATION
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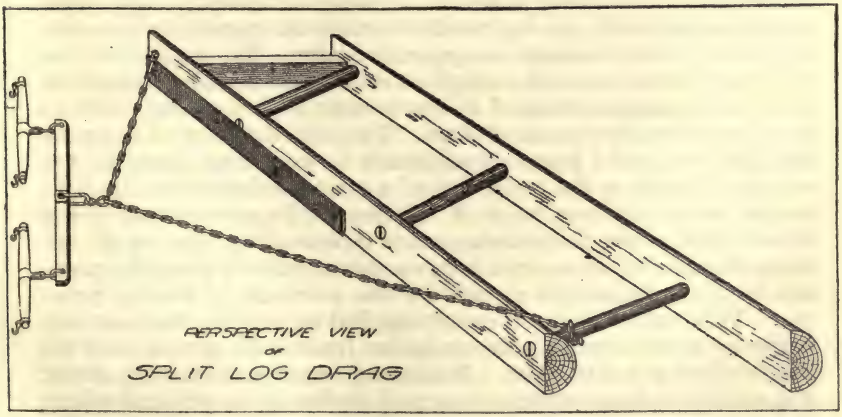

PERSPECTIVE VIEW
OF
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DUST PREVENTIVES

Until comparatively recent years, the macadam road, if properly constructed of suitable material, was theoretically correct and practically sufficient to withstand the average traffic of our rural communities. It was dependent for its bond upon the dust produced by traffic, and so long as this dust remained upon the road surface to be washed into the interstices by occasional rains, a macadam road gave excellent and satisfactory service. With the advent of modern fast motor traffic, however, these roads began to deteriorate rapidly, since the rubber tire created practically no dust, but raised such as there was and allowed it to be carried away from the surface. This displacement not only robbed the road of valuable binding material, but created a menace to the health and comfort of the community. The need for a remedy soon became of paramount importance, and we have at present a great variety of materials for the purpose of laying the dust and thus tending to preserve the surface.

Water has been, of course, the best known and most generally employed dust preventive. It effects a mechanical bond between the particles of dust and rock, and with certain types of rock it has been shown to develop a chemical bond by hydrolyzing some of the rock components with the formation of colloidal cementing materials. The effect, however, is only temporary, and under heavy motor traffic, in dry weather, continual sprinkling is necessary which soon becomes an expensive item. Sea water has been tried with better success, owing to the fact that certain magnesium and calcium salts contained in it are capable of retaining moisture for a considerable length of time. The large amount of common salt also contained forms an objection to sea water, since in wet weather it leads to the formation of a salty mud which is injurious to the paint and iron work of vehicles. The good results of sea water without its disadvantages are obtained by the use of calcium chloride which is obtained as a comparatively cheap by-product in the manufacture of soda by the ammonia or Solvay process. This material was formerly applied in solution, but recently it has been prepared in a fine granular form to be spread over the road surface in a thin layer. It takes up water immediately, giving the surface a damp appearance, and proves quite efficient where the average moisture in the atmosphere is sufficient to feed the salt. Otherwise, an occasional light sprinkling with water is necessary. The salt is, of course, washed away by repeated rains and must be replenished from time to time, so that the cost of the treatment is largely dependent upon local climatic conditions.

The purpose of the above-mentioned materials has been essentially to retain water as a binding agent in the road surface. Another by-product which of itself contains some excellent binding qualities is commercially known as "Glutrin." It is a concentrated waste sulphite liquor obtained by the evaporation and treatment of liquors obtained in the manufacture of paper from wood pulp by the sulphite process. When diluted with water and applied to the surface of a macadam road, it effectively reduces the formation of dust, and produces a firm, hard surface. The binding material, however, is soluble in water, and the treatment must be repeated during a season.

The waste molasses or "black strap" from sugar refineries in conjunction with milk of lime has also been used in surface treatment, and this gives some promise of becoming an economic and satisfactory material in localities where it can be obtained cheaply. It depends for its binding value upon the formation of calcium sucrates by the action of lime on the sugar contained in the molasses. These are tough, sticky substances, sparingly soluble in water and possessing considerable binding value. The use of this material is at present, however, an experimental proposition.

The greatest development in the preparation of dust preventives has been made in the utilization of bituminous products such as petroleums, coal tars and water-gas tars. These materials were first used in their crude state, but the results were only partially satisfactory, so that now we have to deal almost entirely with refined products. Practically the only exceptions to this statement are the recently exploited Trinidad oils, which consist naturally of a light volatile fluid carrying a large amount of true asphaltic base, and some of the more fluid crude California petroleums which are all of an asphaltic nature. Artificial products in many ways resembling the Trinidad oils have been produced by fluxing and cutting back some of the oil asphalts with volatile distillates. Some nonasphaltic petroleum preparations are used with satisfactory results as dust preventives and in proportion to their viscous or adhesive quality, make the fine particles of dust adhere to each other, thereby holding the powdered top dressing in a moist cushion in the center of the road, consequently helping to preserve macadam roadbeds against pitting or raveling.

In order to facilitate the application of petroleum products, more particularly to park roads and suburban streets, emulsions have been prepared with some cheap soap as the emulsifying agent. When such an emulsion is properly compounded, the oil becomes readily miscible with water and can be successfully applied from an ordinary sprinkling cart. Many of the large producers now have on the market so-called emulsified oils which contain a proper amount of soap to permit of their being mixed with water quite readily.

Increasing quantities of tars which are obtained as by-products from our gas and coke industries, are being used for the manufacture of dust preventives and road binders. Low carbon coke oven tars and water-gas tars or mixtures of the two when properly refined are the most desirable of this type of product for cold surface applications; and a considerable amount of work is being done with light tars carrying a small percentage of an oil asphalt in solution.

The cold application of any of the types of petroleum or tar products may be made when the material is sufficiently fluid, but the more viscous products must be heated. In either case, best results are obtained by first cleaning and repairing the road surface, after which an application of sufficient material to uniformly cover the surface should be made. The quite common mistake of flooding the surface and permitting large quantities of material to go to waste in the ditches should be guarded against. When possible, traffic should be kept off the road for ten or twelve hours to allow the application to penetrate thoroughly, after which a light coat of sand or stone screenings may be spread over it. A treatment of this character not only keeps down the dust for some time but, when a proper grade of material is used, forms a protecting mat which prevents excessive wear on the road surface.

A clean, practically dustless surface is the prime requisite for any form of successful surface treatment, and neglect to have such a properly prepared surface is too frequently responsible for unsatisfactory results. The surface should be reasonably clean for the application of a simple dust layer, since it is not the purpose of such an agent to lay any quantity of dust which may be present on the road, but rather to hold the products of wear for a period after the application has been made.

MASSACHUSETTS SPECIFICATIONS FOR STATE HIGHWAYS

Specifications for Tar Grouting

Broken Stone and Bituminous Surfacing.—Section 10. Broken stone consisting of local stone shall be spread and rolled on the road bed prepared as hereinbefore described, as follows:

The width of broken stone shall be fifteen (15) feet.

The lower course shall consist of stones that will pass through a ring two and one-half (2½) inches in diameter and will not pass through a ring one and one-quarter (1¼) inches in diameter, and shall be two (2) inches deep in the centre and sides after rolling.

The lower course shall be shaped to a true section, bound with stones screenings and thoroughly rolled. Any depressions or irregularities which may occur shall be filled with smaller stones as directed by the engineer and again rolled until the surface is smooth, true, and unyielding.

The interstices in this course shall be filled to the surface and there shall be no excess of screenings remaining above the stones after a thorough rolling.

Upon the lower course of stone shall be spread the upper course of stone which shall consist of stones that will pass through a ring one and one-quarter (1¼) inches in diameter, but will not pass through a ring one half (½) inch in diameter, and shall be two (2) inches in thickness after rolling with a steam roller and evened up with material of the same size and quality as has been used in that particular course and to the satisfaction of the Engineer. All broken stone shall be spread from carts by hand or from a dumping board or from self-spreading carts.

Upon the upper course of stone, prepared as hereinbefore described, refined tar shall be uniformly applied with a pressure machine at the rate of one and one-quarter (1¼) gallons to each square yard of surface, and immediately covered with clean local pea stone and then thoroughly rolled.

A second application of refined tar shall then be made in the same manner as in the first application at the rate of one-quarter (¼) gallon per square yard and immediately covered with clean local pea stone and then thoroughly rolled.

If so ordered by the engineer the thickness of the broken stone shall be increased or diminished at such points as he may direct.

No soft or disintegrated stone shall be used.

In distributing the tar no overlapping shall be allowed.

The contractor shall sprinkle the road with water when and as directed by the engineer.

All depressions in any course shall be filled with the same material used in that particular course and shall be rolled until a smooth, true and unyielding surface is obtained.

The bituminous binder shall consist of refined tar and when applied to the road surface it shall have a temperature approximating 200° F.

If at any time before the acceptance of the work any soft or imperfect places or spots develop in the surface, all such places shall be removed and replaced with new material and then rolled until thoroughly compacted, and until the joints or edges at which the new work connects with the old become invisible. All such removal and replacement of unsatisfactory surfacing shall be done at the expense of the contractor.

No bituminous work shall be done during rainy weather nor when weather conditions as to temperature or otherwise are, in the opinion of the engineer, unfavorable to obtaining satisfactory results.

The Massachusetts highway commission will furnish all refined tar necessary for the work in tank cars at the railroad freight station nearest to the site of the work.

The commission will order the tar when requested so to do by the contractor.

The contractor shall be responsible for any and all railroad storage charges and for any loss or damage to material that may accrue after the delivery of the tar at the railroad delivery selected.

The contractor is to heat the tar in tank cars or otherwise, team the tar to the site of the work, and apply thereon as specified without compensation additional to the price paid per gallon for bituminous surfacing.

Double Penetration Method

Broken Stone and Bituminous Surfacing.—Section 10. Broken stone consisting of trap rock or rock which in the opinion of the engineer is equal to trap rock—local stone shall be spread and rolled on the road-bed prepared as hereinbefore described, as follows:

The width of the broken stone shall be fifteen (15) feet.

All broken stone used shall be laid in layers or courses.

The lower course shall consist of stones that will pass through a ring two and one-half ($2\frac{1}{2}$) inches in diameter and will not pass through a ring one and one-quarter ($1\frac{1}{4}$) inches in diameter, and shall be three (3) inches deep at the centre and two (2) inches deep at the sides, after rolling.

The lower course shall be shaped to a true section, bound with sand or stone screenings and thoroughly rolled.

Any depressions or irregularities which may occur shall be filled with smaller stones, as directed by the engineer, so that the surface will be smooth, true and unyielding. The interstices in this course shall be filled to the surface, and there shall be no excess of sand or screenings remaining above the stones after a thorough rolling.

If sand is used in this course it shall be of a quality satisfactory to the engineer, and shall be measured and paid for as borrow.

The broken stone in the lower course shall be spread from the carts by hand, or from a dumping board, or from self-spreading carts.

Upon the surface prepared as hereinbefore described heavy asphaltic oil shall be uniformly applied with a pressure machine at the rate of five-eights ($\frac{5}{8}$) of a gallon to each square yard of surface.

Immediately after the application of the oil a course of stone consisting of broken trap rock in sizes varying from one-half ($\frac{1}{2}$) inch to one and one-quarter ($1\frac{1}{4}$) inches in their longest dimensions shall be applied by spreading by hand from piles previously distributed on the side of the road, the course to be one and one-half ($1\frac{1}{2}$) inches in thickness after rolling.

A second application of oil shall then be made in the manner previously described and at the rate of five-eighths ($\frac{5}{8}$) of a gallon to each square yard of surface.

Immediately after this second application of oil a course of stone of the same sizes as in the first application shall be lightly spread in quantity sufficient to cover the oil, and then thoroughly rolled; after which, a third application of oil shall be made in the manner previously described at the rate of one-quarter ($\frac{1}{4}$) of a gallon to each square yard of surface, immediately covered with clean trap rock pea stone, and then thoroughly rolled.

The bituminous binder shall consist of asphaltic oil and when applied to the road surface, it shall have a temperature approximating 250° F.

If so ordered by the engineer the thickness of the broken stone shall be increased or diminished at such points as he may direct.

The finished surface of the road shall present such crown as shall be directed by the engineer.

No soft or disintegrated stone shall be used.

In distributing the oil no over-lapping shall be allowed.

The contractor shall sprinkle the road with water when and as directed by the engineer.

All depressions in any course shall be filled with the same material used in that particular course and shall be rolled until a smooth, true and unyielding surface is obtained.

If at any time before the acceptance of the work any soft or imperfect places or spots develop in the surface, the material at all such points shall be removed and replaced with new material, and then rolled until thoroughly compacted, and until the joints or edges at which the new work connects with the old become invisible.

All removal and replacement of unsatisfactory material shall be done at the expense of the contractor.

No bituminous work shall be done during rainy weather nor when weather conditions as to temperature or otherwise are, in the opinion of the engineer, unfavorable to obtaining satisfactory results.

The Massachusetts highway commission will furnish all asphaltic oil necessary in tank cars at the railroad freight station nearest to the site of the work.

The commission will order the oil when requested so to do by the contractor.

The contractor shall be responsible for any and all railroad storage charges and for any loss or damage to material that may accrue after the delivery of the oil at the railroad delivery selected.

The contractor is to heat the oil in tank cars or otherwise, team the oil to the site of the work, and apply thereon as specified, without compensation additional to the price paid per square yard.

Hot Oil Blanket Coat

Bituminous Wearing Course.—Section 10a. After the macadam road has been finished as herein described, the surface shall be swept with brooms, or a horse sweeper, approved by the engineer, and so as to fully expose the stones of the upper course and to remove to a slight extent the binder between them. If directed by the engineer, the road shall then be watered slightly. Upon the surface for the full width of the macadam the bituminous binder hereinafter described shall be applied in a thin film, shall be heated to the temperature hereinafter stated and distributed evenly by means of a machine approved by the engineer, so designed as to enable its operator to control the flow and to distribute the material uniformly, leaving no streaks or spots and so designed as to enable its operator to "cut out" any portion of the roadway and to avoid any surplus deposit of the binder on the roadway or elsewhere. If the engineer shall so direct the bituminous binder shall also be further distributed by means of soft brooms or "squeegees." For this portion of the work not more than one-half (½) of a gallon of said material to the square yard of surface shall be required.

As soon as may be after the application of the bituminous binder, as above specified, a thin layer of sand shall be distributed evenly thereon to such a depth that after rolling to the satisfaction of the engineer no surplus binder shall appear upon the surface of the roadway and so that there shall be a wearing course of the sand combined with the bituminous binder approximating one-half ($\frac{1}{2}$) inch in depth.

The completed surface of the roadway shall be smooth, conforming to the profile and cross-section, and free from hollows or depressions, and if at any time before the acceptance of the work spots or streaks appear, indicating a deficiency or a surplus of the bituminous binder, the surface shall be again treated with more of the binder or sand, as the case may be, and if directed by the engineer the surface shall be lightly watered and thoroughly rolled.

The bituminous binder shall consist of asphaltic oil, and when applied to the road it shall have a temperature approximating 250° F.

The sand used shall be clean, sharp and dry, free from loam, clay and foreign matter of all kinds. It shall contain no pebbles which will not pass through a one-half ($\frac{1}{2}$) inch mesh nor practically any grains or particles which will pass through a screen of thirty (30) meshes to the lineal inch.

If the contractor so desires he may use stone screenings instead of sand but it is understood that he will receive no extra compensation therefor and that the screenings must conform in general with the requirements of the specifications for sand.

The Massachusetts highway commission will furnish all asphaltic oil necessary for the work in tank cars at the railroad freight station nearest to the site of the work. The commission will order oil when requested so to do by the contractor, and the contractor hereby agrees that he will make no claim for damages of any kind which may be caused by any haste or delay in the delivery of the asphaltic oil. The contractor is to heat the oil in tank cars or otherwise, team the oil to the site of the work, and apply thereon as specified, without additional compensation.

Bituminous Macadam Surface—Mixing Method

Excavation of Broken Stone in Present Road Surface.—Section 9. The present macadam surface of the road is to be loosened with picks placed in the wheels of a steam roller or otherwise. The material so loosened is to be scarified or harrowed with a tooth harrow, so as to leave only clean broken stone on the surface, raked, shaped, and new stone added where necessary, and rolled with a steam roller to an even firm surface two (2) inches below the finished grade to the satisfaction of the engineer. Wherever it is necessary, the broken stone in the present road surface shall be screened and moved and spread on the road surface where required.

Broken Stone.—Section 10. Broken stone consisting of trap rock or rock which in the opinion of the engineer is equal to trap rock shall be spread on the roadbed prepared as hereinbefore described wherever it is necessary to give, in addition to the broken stone in the present road surface, the required width of thirty (30) feet and a depth of not less than four (4) inches in the centre and sides, after rolling. The size of the stones used in the bottom course (in addition to those in the present road surface) shall be not larger than two and one-half (2½) inches in their longest diameter and not smaller than one and one-quarter (1¼) in their shortest diameter, as the engineer shall determine.

The bottom course shall be rolled by a steam roller and evened up with material of the same size and quality as has been used in that particular course, and to the satisfaction of the engineer.

All broken stone shall be spread from the carts by hand, or from a dumping board, or from self-spreading carts.

No soft or disintegrated stone shall be used.

If so ordered by the engineer the thickness of the broken stone shall be increased or diminished at such points as he may direct.

The grade of the finished surface of the road shall present such crown as shall be directed by the engineer.

If local stone or stone not shipped by rail is used it shall be weighed on scales furnished by and at the expense of the contractor. Said scales shall be satisfactory to the engineer and they shall be sealed at the expense of the contractor as often as the engineer may deem necessary to insure their accuracy.

A sworn weigher, to be appointed and compensated by the selectmen, shall weigh all broken stone required to be weighed as above provided.

If the stone is shipped by rail the car weights may be accepted, unless the engineer shall determine that scales shall be used as above.

Bituminous Mixture.—Section 11. On the bottom course of broken stone, prepared as hereinafter specified, shall be spread according to lines and grades given by the engineer, the bituminous mixture which shall consist of trap rock broken stone mixed with asphalt; the sizes of stone, proportions of stone and of asphalt, and method of mixing and spreading to be as hereinafter described.

The bituminous mixture shall be laid in one course and shall be, after rolling, two (2) inches in thickness.

The width shall be thirty (30) feet.

The broken stone shall be trap rock and shall vary in size from one-quarter (¼) inch to one and one-quarter (1¼) inches and no stones larger than one and one-quarter ($1\frac{1}{4}$) inches in their longest diameter shall be used. All broken stone used shall be absolutely clean and free from adventitious matter.

When the broken stone has been heated to not less than 180° F., or more if the engineer so required, it shall be mixed with the asphalt by machines, which shall be approved by the engineer, and as the engineer may direct, until all particles of stone are covered with asphalt.

Sixteen (16) gallons of asphalt measured at temperature of the air shall be mixed with each cubic yard of stone.

Before mixing with the stone, the asphalt shall be carefully heated to not less than 350° F. and at that temperature shall be mixed with the stone. No asphalt shall be used after it has been injured by over-heating or burning. The contractor shall heat the asphalt in suitable kettles satisfactory to the engineer.

After being properly prepared as hereinbefore specified, the mixture shall be teamed to the road and spread before it has cooled to a temperature below 100° F.

The mixture shall be dumped on steel dumping platforms or shovelled directly from the cart into place. As the spreading is done rakes shall be used to obtain a uniform distribution of stones and an even surface before rolling.

The mixture, after being satisfactorily spread and raked, shall be at once rolled with a tandem roller, weighing not less than seven (7) tons, care being taken not to push the mixture out of place by the roller, but to roll as as to lay it down, compressed to a perfect cross-section, and true to line and grade. During very hot weather the rolling shall be postponed until cool enough to roll without pushing out of place and shape.

If any unevenness or depressions appear during or after rolling the bituminous mixture, suitable mixed material satisfactory to the engineer shall be added, and rolled in a manner to remove all such unevenness or depressions.

Immediately after the bituminous mixture is rolled to a firm surface and free from irregularities, a seal coat of Bermudez road asphalt shall be so applied as to completely cover the surface, using one-third ($\frac{1}{3}$) of a gallon of asphalt per square yard of surface. It shall be carefully spread with "squeegees" or brooms.

Immediately after it has been spread it shall be covered with clean trap rock pea stone and rolled until the pea stone is bonded with the asphalt of the seal coat.

If at any time before the acceptance of the work any soft or imperfect places or spots develop in the surface, all such places shall be removed and replaced with new material and then rolled until thoroughly compacted, and until the joints or edges at which the new work connects with the old become invisible. All such removal and replacing of unsatisfactory surfacing shall be done at the expense of the contractor.

No teaming or travel of any kind shall be allowed to pass over the new surface until twenty-four hours have elapsed after the final rolling, or until the surface has become sufficiently hardened to prevent injury by picking up or tracking.

No bituminous work shall be done during rainy weather nor when weather conditions as to temperature or otherwise are, in the opinion of the engineer, unfavorable to obtaining perfect results.

In order to provide for passing traffic during the progress of the work it will be necessary to construct only one-half of the width of the roadway at one time. The bottom course of that portion of the roadway which shall first be laid shall be extended two (2) feet beyond the centre of the road or two (2) feet beyond the inside edge of the bituminous mixture so as to provide a firm base for the bituminous mixture, also to satisfactorily bond into the remaining portion of the bottom course when laid.

The bituminous mixture and sealing coat of that portion first laid shall lap over beyond the line of the joint at the centre of the roadway, so that when the second half is laid the first half can and shall be cut back to a uniform longitudinal line and perfect vertical section so as to obtain a perfect joint and cross-section.

From the time of commencement of laying the bituminous mixture during and until the time the final covering of pea stone is spread on the seal coat, the adjoining surface on any or all sides of the portion under construction shall be kept watered as directed by the engineer to prevent dust alighting on the bituminous surface.

The selectmen will furnish all asphalt in barrels in cars at the railroad siding requested by the contractor.

The selectmen will order the asphalt so that the first delivery of ten thousand (10,000) gallons shall be made on or about April 15 and thereafter at the rate of ten thousand (10,000) gallons a week until the entire quantity has been received.

The contractor shall be responsible for any and all railroad charges and for any loss or damage to material after the delivery of the asphalt at the railroad siding.

The contractor shall at his own expense team the asphalt to the work, store it and protect it from the weather to the satisfaction of the engineer.

Sand and Oil Road—Mixing Method

Bituminous Surface.—Section 10. Upon the road bed prepared as described in Section 9, the sand and oil surfacing shall be applied as follows:

The sand and oil shall be mixed by hand or with a mechanical mixer, or by other means furnished by the contractor, provided the method employed is approved by the engineer. If the mixing is done by hand, it shall be done on tight platforns, to be furnished by the contractor, the platforms to be made of two (2) inch plank, about sixteen (16) feet in length, and in two sections, each about four (4) feet in width.

The contractor shall furnish and operate at least four (4) mixing platforms and four (4) heating kettles or tanks, and a sufficient number of sand heaters, and if in the opinion of the engineer the work is not proceeding with sufficient rapidity to insure its completion within the time specified in the contract, the contractor shall furnish and operate a sufficient number of additional platforms, kettles, and sand heaters to insure the work being so completed within the specified time.

The contractor will be allowed to mix the hot sand and oil with a mechanical mixer or other means furnished by him, provided the method employed is approved by the engineer.

The kettles or tanks for heating the asphaltic oil shall be of a design satisfactory to the engineer, and of a capacity of not less than sixty (60) gallons each.

The sand shall be dry and so heated that when mixed with the oil a uniform mixture will be secured. Care must be taken not to overheat the sand so as to burn the oil.

The sand and oil shall be mixed in batches of approximately one (1) cubic yard, the ssnd being spread upon the mixing platform and the hot oil poured upon it and the whole mass thoroughly turned with shovels, hoes, or rakes, until each particle of sand is completely covered with oil, about sixteen (16) gallons of oil being required for one (1) cubic yard of sand as measured loose in measure box.

The oil when mixed with the sand shall be hot enough to secure a good mixture, and shall be of a temperature between 250° F. and 375° F., depending on nature of oil used.

When the mixture is completed to the satisfaction of the engineer it shall without delay be spread while still warm upon the subgrade to a width of sixteen (16) feet and to a depth of four (4) inches at the centre and three (3) inches at the sides, after rolling with a tandem roller weighing approximately six (6) tons.

After the mixed material is deposited in place and shaped with rakes, etc., it shall, before it hardens, be rolled with a horse roller weighing about one (1) ton, then shaped with a road machine or with a suitable scraper and afterwards rolled with a tandem roller to the satisfaction of the engineer. A hand roller weighing about two hundred (200) pounds may be used before rolling with the horse roller if preferred.

If any depressions appear after scraping and rolling the sand and oil mixture, suitable mixed material satisfactory to the engineer shall be added. If such depressions are found after the sand and oil has hardened so that the new mixture will not readily bond with the old, the old mixture shall be dug out to a depth satisfactory to the engineer and the new material added.

Any slight unevenness of the surface shall be remedied by scraping with a road machine or a suitable scraper, and the surface shall then be rolled in a manner to remove all such depressions and leave a smooth and even surface.

After the sand and oil mixture is rolled to a firm surface, free from all irregularities and all surplus loose material, a seal coat of asphaltic oil shall be distributed at the rate of one-half (½) of a gallon per square yard of road surface.

The oil so applied shall be uniformly covered with a thin layer of sand and rolled to the satisfaction of the engineer.

The asphaltic oil when applied to the road surface shall have a temperature approximating 250° F.

If so ordered by the engineer the thickness of the sand and oil mixture shall be increased or diminished at such points as he may direct.

The sand shall be clean, sharp, and dry, free from loam, clay and adventitious matter of all kinds. It shall contain no stones larger than one-half (½) inch in their longest dimensions, nor practically any grains or particles which will pass through a screen of fifty (50) meshes to the lineal inch.

The finished surface of the road shall present such crown as shall be directed by the engineer.

In distributing the oil no over-lapping shall be allowed.

The contractor shall sprinkle the road with water when and as directed by the engineer.

All depressions in any course shall be filled with the same material used in that particular course and shall be rolled until a smooth, true and unyielding surface is obtained.

If at any time before the acceptance of the work any soft or imperfect places or spots shall develop in the surface, the material at all such points shall be removed and replaced with new material, and then rolled until thoroughly compacted, and until the joints or edges at which the new work connects with the old become invisible.

All removal and replacement of unsatisfactory material shall be done at the expense of the contractor.

No bituminous work shall be done during rainy weather nor when weather conditions as to temperature or otherwise are, in the opinion of the engineer, unfavorable to obtaining satisfactory results.

The Massachusetts highway commission will furnish all asphaltic oil necessary for mixing in barrels and for sealing coat in tank cars at the railroad freight station nearest to the site of the work.

The commission will order the oil when requested so to do by the contractor.

The contractor shall be responsible for any and all railroad storage charges and for any loss or damage to material that may accrue after the delivery of the oil at the railroad delivery selected.

The contractor is to heat the oil in tank cars or otherwise, team the oil to the site of the work, and apply thereon as specified, with out compensation additional to the price paid per square yard for bituminous surfacing.

Shaping Surface for Sand and Oil.—Section 9. Before the sand and oil is spread the road-bed shall be shaped to a true surface conforming to the proposed cross-section of the highway and rolled by a steam roller, unless otherwise ordered by the engineer. All depressions occuriing must be filled with suitable material and again rolled, until the surface is smooth and hard.

The cost of shaping and rolling the road-bed shall be included in the price paid for excavation and for furnishing the material used, and shall not be additional thereto.

When in the opinion of the engineer it is necessary to place hardening material on the subgrade of the road before the sand and oil is spread, the contractor shall spread clay or other material satisfactory to the engineer and roll the same in such manner as is satisfactory to the engineer, and with such weight of roller as he may direct.

Sand and Oil surfaces.—Section 10. Upon the roadbed prepared as described in Section 9 shall be applied asphaltic oil for a width of fifteen (15) feet, by means of a distributor, so arranged as to enable the operator to control the flow and distribute the oil equally and uniformly, leaving no spots or streaks uncovered and to avoid spreading a surplus of oil at any point, and to completely control the quantity of oil delivered on the road.

The oil shall be spread on the road at a temperature not greater than 250° F., and not less than 180° F., and shall be so heated as to insure its delivery on the road at the required temperature.

There shall be three applications of oil, the quantity for each application to be on the average not less than two-thirds ($\frac{2}{3}$) of a gallon per square yard.

After the first application of oil has been made and as soon thereafter as the engineer may direct, a layer of sand shall be uniformly spread thereon of sufficient depth to insure a thickness of approximately one (1) inch after rolling.

As soon thereafter as the engineer may determine, the second and third applications of oil and sand shall be applied in the same manner as in the first application and to the satisfaction of the engineer.

After three layers of oil and sand have been applied in the prescribed manner, the road shall be rolled by a roller of such size and weight as the engineer may determine.

During the rolling, sand shall be applied to absorb any oil which may flush to the surface and in such quantities as the engineer shall direct.

After the rolling has been completed to the satisfaction of the engineer, a thin layer of sand shall be spread evenly over the entire oiled surface.

All sand shall be clean, sharp and free from loam, clay and adventitious matter of all kinds and shall meet with the approval of the engineer.

The beginning and ending of sections of road under treatment shall be suitably barricaded and posted with warning signs as shall also all roads entering upon such sections.

If at any time before the acceptance of the work any soft or imperfect places or spots shall develop in the surface, the material at all such points shall be removed and replaced with new material and then rolled until thoroughly compacted, and until the joints or edges at which the new work connects with the old become invisible.

All removal and replacement of unsatisfactory material shall be done at the expense of the contractor.

No bituminous work shall be done during rainy weather nor when weather conditions as to temperature or otherwise, are in the opinion of the engineer, unfavorable to obtaining satisfactory results.

The contractor shall keep all of the sections of road constructed by him covered with sand to the satisfaction of the engineer for a period of sixty (60) days after the completion of the work.

STATE PROGRESS REPORTS

Alabama

The State highway department of Alabama was created by an act of the legislature approved April 11, 1911. There are five commissioners who serve without salary, but their actual expenses incurred in the performance of official duty is allowed. There is a State highway engineer and one assistant. Resident engineers are appointed by the State highway engineer, who are placed in actual charge of construction work in various counties.

There is appropriated $10,000 a year for the expenses of the commission and salary of State highway engineer, his assistant and clerk and their actual traveling expenses and expenses of the office.

Annually $2000 is available from the State for each county, provided the county will appropriate a like amount and build a section of road or bridges under the direction of the State highway department. As far as possible, roads are built with local available material. Specifications require that no road shall have a graded width between ditches of less than 20 feet; no surfacing material is spread less than ten feet in width and minimum width is discouraged. Maximum grade is 5 per cent.

The work is executed by contract or county forces, either hired labor or convicts, depending on local conditions. Since the creation of the department, 59 of the 67 counties in the State have applied for State aid and work has been completed or under way in 48, involving an expenditure of approximately $331,000. The result of this expenditure will be: fourteen steel and concrete bridges varying in length from 20 to 500 feet and approximately 193 miles of road classed as follows:

	Miles
Graded earth	59
Sand-clay	61
Gravel	37
Chert	25
Macadam	11
Total	193

Counties are required to maintain these roads and should they fail, the State highway department has authority to make repairs out of any money due the county for construction purposes.

The cost of the various roads is about as follows:

	Per mile
Graded earth, 20 feet wide	$750 to $1500
Sand-clay, grade 22 feet wide, surfacing 14 feet	1250 to 2000
Gravel and chert, grade 20 to 24 feet, surfacing 12 to 16 feet	2000 to 3000
Macadam, grade 20 to 24 feet, surfacing 10 to 16 feet	3000 to 4000

W. S. Keller,
State Highway Engineer.

Alaska

Extract from report of board of road commissioners for Alaska, Lieut.-Col. W. P. Richardson, U. S. A., president; First Lieut. Glen E. Edgerton, engineer officer.

The approximate total mileage of wagon road, sled road, and trail constructed by the board since its organization up to July 31, 1912, is as follows: Wagon road, 829 miles; winter sled road, 599 miles; trails, 1552 miles. In addition the board staked during last winter approximately 450 miles of trails for winter travel only. Since the above date the following additional mileage has been under construction and is now practically completed: Wagon road, 18 miles, winter sled road, 52 miles, trail, 32 miles. An allotment of $5000 has been made for construction of a winter trail from Fairbanks to Chena Hot Springs, an approximate distance of 80 miles. This sum is not sufficient for the construction of a good winter road, which is needed, but will doubtless be of great benefit to the communities named.

California

The State has undertaken to construct and maintain a system of State highways distinct from the State roads built under legislative appropriation, and has appropriated the sum of $18,000,000 for the purpose.

The State highways act outlines in somewhat general terms the scope of the work, the locations of the routes, places the jurisdiction over the proposed State highways in the department of engineering, and provides for a bond issue of $18,000,000 and for a State highway fund and a State highway sinking fund. This act was approved by the people at the general election held in November, 1910.

The commission has organized its work after the fashion of a modern business corporation. The commissioners act as a board of directors. Reporting directly to the commission are its secretary, the highway engineer, and the attorney. The highway engineer was made the executive officer of the commission corresponding to the general manager of a business corporation. Under him are the several departments of the work: Engineering and operating department, legal department (in right of way matters), purchasing department, accounting department, disbursing department.

The chiefs of the several departments report directly to the highway engineer.

Beginning with May 21, 1912, the advisory board of the department of engineering, have adopted sections of State highway aggregating 225.1 miles in length. Contracts for the construction of State highways have been authorized aggregating about 150 miles.

Work is now in progress on most of the contracts. State highway bonds had been sold previous to and including November 12, 1912, to the amount of $2,000,000.

The commission has expended for preliminary expenses, surveys, overhead expenses and for road contracts to and including November 15, 1912, the total sum of $446,068.70

A. B. Fletcher,
Highway Engineer.

Delaware

The good roads work in this State was first taken up under an act of the general assembly approved April 14, 1903, which provided for the appointment of a commission of three, one from each county in the State, which had charge of all improved roads to be built in the State under State aid.

The act provided that the State would pay one-half the cost of building roads in each of the three counties if the cost per year to the State did not exceed $10,000 for each county. The act also required that public meetings be held for the promotion of the good roads sentiment.

The commissioners appointed under this act were Cornelius J. Horrigan, chairman; Walter J. Harrington, secretary, and John Barr.

Under this law there were built 7.98 miles in New Castle County, and 0.907 miles in Sussex County.

The above-mentioned law was repealed at the session of the general assembly held in 1905 and the law under which we are now working in New Castle County was approved March 3, 1905. This law created the office of New Castle County State highway commissioner, applied to New Castle County only, and provided for State aid to the extent of $10,000 per year. The highway commissioner however has charge of the building of all improved roads in the county whether State money is used or not and all plans, specifications and contracts must be approved by him before they become effective, and no bills can be paid without his approval; in other words the highway commissioner and the levy court are both responsible for the proper building of the roads and the payment of all bills relating thereto. The highway commissioner has no jurisdiction over the roads after they are finally accepted from the contractor.

Under this law there have been built in this county 130.49 miles of new roads; and 0.73 miles of road resurfaced with an asphaltum top put on by the penetration method. This makes a total of 131.22 miles of improved roads in this county, all of which is waterbound macadam with the exception of about 3.13 miles of a bituminous surface, penetration method, and 0.94 miles of Amiesite road.

The expenditures on construction of roads has been about $1,206,778 making an average cost of construction of $8715 per mile. This cost includes the construction of bridges, culverts, mostly concrete, and all other appurtenances necessary in the proper construction of a good road.

The estimated length of all public roads in this county is about 1000 miles from which it may be seen that nearly 14 per cent of our public roads are improved roads.

The commissioner appointed under the act of March 30, 1905, was Francis A. Price who held the office until January 7, 1913, when he was succeeded by James Wilson, the county engineer of New Castle County, thus combining the two offices in one person.

There was a law similar to the law of 1905 for New Castle County, passed by the general assembly in April, 1909, creating the office of Kent County State highway commissioner and authorizing the county to issue bonds for $100,000 for road purposes.

Mr. C. B. Hope was appointed highway commissioner but I understand that the levy court did not issue any bonds and that no work has been done in Kent County under that law.

Sussex County has no highway commissioner.

Both Kent and Sussex Counties are each entitled to receive $10,000 per year for the improvement of roads.

Francis A. Price,
Ex-Commissioner.

District of Columbia

The present form of government of the District of Columbia was established in 1878 and this date approximates the commencement of the use of the modern type of pavement in this city. From 1878 to 1912 inclusive, the expenditures for roadway improvements have been approximately as follows:

For new street paving	$8,000,000
For macadamizing and paving suburban streets and roads	3,000,000
For resurfacing and repaving	6,500,000
For repairs to suburban streets and roads	1,900,000

The present mileage of roads and paved streets, exclusive of roadways in parks, is as follows:

	Square yards	*Miles*
Sheet asphalt	3,343,978	146.93
Asphalt block	648,368	33.02
Granite block	664,347	25.96
Vitrified block	29,602	1.40
Bituminous concrete	34,622	1.75
Cement concrete	7,931	.54
Bituminous macadam	69,140	4.94
Waterbound macadam	1,431,635	92.10
Gravel and dirt roads	2,083,327	160.06

New streets are paved and old streets resurfaced under contract and the contractor guarantees the pavement for a period of five years from the date of its completion; this guarantee is covered by bond and in addition a retent of 10 per cent of the cost of the work is held during the guarantee period.

The repair of suburban streets and roads is performed by day labor and not under contract.

This office has recently inaugurated the municipal repair of roadway pavements but the resurfacing of the entire roadway, after expiration of the guarantee period, is done under contract. We are preparing data for presentation to congress with the object of advocating the establishment of a municipal asphalt plant to do all of the work of paving, repairing and resurfacing the modern roadway pavements.

DANIEL E. GARGES,
Chief Clerk, E. D.

Idaho

Extract from report of A. E. Robinson, state engineer, covering two years to November 1, 1912.

The construction of five roads was authorized, the State appropriating $76,500 therefor, the total cost of the roads to be $115,500. With the exception of the Kootenai wagon road in Bonner County and the Leadore-Pahsimeroi road in Lemhi County, these roads were constructed during the past two years. The additional $25,000 required for the Kootenai road was not subscribed, and the $5000 additional subscription for the Leadore-Pahsimeroi road was made so late that it was not possible to complete the road, but good progress has been made thereon.

Extract from cost data. Ross Fork Road

Length of finished road	2.5 miles
Total width of road	40 feet
Total width of rock surface	12 feet
Total cost per mile	$8000
Total cost per square yard of rock surface	$1.13

Illinois

The detailed statement submitted by Mr. A. N. Johnson, State highway engineer, shows that the appropriations for the State highway department were as follows: 1906, 1907 and 1908, $50,000 per annum; 1909, 1910, $65,000 per annum; 1911, $100,000 (to July 1, 1912, end of fiscal year), a total of $380,000. Throughout this period there were 721 public meetings held, 722,803 cubic yards of crushed stone prepared by State convicts, equivalent to 361.1 miles of road. There were constructed under the State highway engineer 115.5 miles of experimental road; 1232 bridge inspections made; 97 steel bridge and 456 reinforced concrete bridge contracts made, and 460 bridges built. The value of the road work done is estimated at $1,549,997; the value of bridge contracts let $927,627, making a total value of all work done by the department to July 1, 1912, of $2,477,624.

Kansas

Plans and specifications for bridge work finished or under contract, $160,000; plans and specifications for bridge work not completed, $150,000; plans and specifications for road work, $25,000; plans and specifications for drainage work under construction, $90,000; plans and specifications for farm tile drainage, $7000; consulting and supervising engineer to highway officials on bridge work being done on plans not furnished by the State, aggregating a value of $76,000; board of arbitrators in bridge case in Smith County involving $95,000; inspection of bridge work in Mitchell County involving $65,000; inspection of bridge work in Norton County involving $15,000; value of public property on which engineering services have been furnished, $683,000. In the campaign for good roads speakers have been furnished for 405 meetings addressing a total of 51,000 people. Two good roads trains have been concluded. There have been distributed 75,000 bulletins, tracts or other publications.

W. S. GEARHART,
State Engineer.

Kentucky

Road work in Kentucky received a great impetus recently due to the legislation of 1912 in favor of good roads for this State, which legislation was the first step toward creating State supervision in road work. It appropriated $25,000 a year to be expended by the State highway commissioner, by and with the approval of the governor in waging an educational campaign throughout the State in favor of good roads. This campaign is at present being waged by distributing literature, furnishing speakers for farmers' institutes, holding road institutes, and building demonstration roads throughout the State.

This department is only in process of organization. R. C. Terrell, former professor of highway engineering at State University of Kentucky, was appointed by Governor James B. McCreary July 1, 1912, as commissioner of public roads. Immediately upon Mr. Terrell taking the oath of office he appointed a stenographer to facilitate the correspondence and the office work, and W. J. Carrel, bridge engineer, to assist in furnishing plans to the various counties for bridges and to look after the construction work being done in the State.

Mr. J. F. Grimes was added to the force, as assistant engineer and later Marion D. Ross was also added in the same capacity.

The law of Kentucky does not provide for any State aid in road work. The $25,000 a year appropriated may be used only to furnish engineering advice, assistance, lecturing and demonstration work. Speakers at various road meetings have been furnished and Mr. Grimes has been engaged in coöperation with the Farmers Institute work, giving advice and creating a road sentiment throughout the State.

Mr. Ross has been engaged in demonstration work in Rowan County, where he superintended the construction of several stretches of model road to show the advantages that may be derived therefrom. This work was done at the request of Mrs. Cora Wilson Stewart, county superintendent of schools, and thoroughly demonstrates the use of their native gravel as a road surfacing material.

Also Wayne County has taken advantage of the advice of this department to the extent of having an estimate made of some roads constructed through solid rock excavation.

Ballard County also has taken advantage of the advice offered for road work and Mr. Grimes inspected and furnished an estimate for gravel road.

Crittenden County was also furnished an estimate and advice concerning some water bound macadam road.

Our bridge work has consisted of making surveys, furnishing plans, specifications and estimates of cost of 33 bridges in 20 counties of the State.

Literature is being gradually distributed throughout the State and more is in course of preparation.

The next legislature, which meets in 1914, will probably strengthen the present law, add to our appropriation and probably pass the State aid clause.

ROBERT C. TERRELL,
State Highway Commissioner.

Louisiana

From tabular information submitted by the State highway department, it appears that from the organization of the department to January 1, 1913, a total of 196.69 miles of road had been let to contract at an estimated cost of $413,453.09, on which payments had been made by the state of $87,715.42, and by the parishes of $125,293.44. Of the mileage under contract 125.19 miles were completed December 31, 1912. Of the total mileage under contract 151.19 miles were earth road, 36 miles shell road and 9.5 miles petrolithic road. There were also constructed by convict labor 174.11 miles between January 1, 1908, and January 1, 1913, making a total completed of 299.30 miles.

State highway department reports the work done during the year 1912 as follows:

Completed, shell roads, 3 miles, cost $11,790.72; earth road, 28.75 miles, cost $55,498.47. On all of this mileage the State paid half and the parish half. The mileage under contract and not completed, earth road, 58 miles, cost $67,238.37; shell road, 5 miles, cost $11,803.66; petrolithic road, 4 miles, cost $23,655.20. A reserve of 20 per cent has been retained on all contracts not completed. The mileage of all roads completed or under contract in 1912 is given as 100.75 miles. The roads constructed by convict labor amount to 26.63 miles, costing $29,944.80. The total mileage of all roads constructed or under contract, including the roads on which convict labor was used, aggregated 127.38 miles. The total expenditure by parishes was $101,098.88; by the State $68,887.54, and on account of convict camps $29,944.80, or a total expenditure for 1912 of $199,931.22.

Maryland

The following résumé is based upon a statement issued by Governor Goldsborough October 3, 1912, and additional information given by Mr. H. G. Shirley, chief engineer, State roads commission:

Organization.—On June 1, 1912, a new system of bookkeeping and accounting was installed. By this system a detailed statement of costs for the counties and for the State can be shown each month and for the whole period since April 30, 1908, in a few hours. On August 15 a reorganization of the engineering department was inaugurated by which the construction and maintenance departments were consolidated, thus avoiding duplication of inspection trips and making a considerable saving of expense. The State was divided into eight geographical sections of from two to three counties with a resident engineer at a central point in each section, responsible for all construction and maintenance and supplied with a motor-cycle so that he could reach all parts of his territory quickly. On August 20 a purchasing department was organized by which all supplies, materials, machinery, etc., are bought by a purchasing agent. This, too, is expected to result in large saving for the State.

A system of handling the numerous pay-rolls throughout the State through a paymaster, similar to that used by large railroads, has been adopted.

Equipment.—A complete inventory has been made of equipment, storehouses erected at convenient points throughout the State, and a man placed in charge of the equipment. A plan is being considered of having the State own equipment and rent it to counties.

Types of Road.—In western Maryland the operations are largely confined to re-surfacing of the Frederick and National Pikes from Baltimore to Pennsylvania line. In southern Maryland sand-clay-gravel roads are being built. On the Eastern Shore the choice is practically restricted to stone macadamized roads, with a probable future for concrete. In central Maryland water-bound macadam, concrete, and vitrified brick are being utilized.

Maintenance of Roads.—The State has nearly 275 miles of road constructed, and has taken over 190 miles of turnpikes, making 465 miles in operation, and it is estimated that this will be increased to 800 miles with the money already appropriated. The patrol system has been extended. It is planned to have a roller for each resident engineer at the center of his territory and also sufficient oil wagons to have his road oiling done promptly. Nearly all of the 200 miles of completed road that needed it have been oiled for the winter. Plans are being made to purchase during the winter especially designed oiling trucks available for carrying stone, etc., when not in use for oiling.

Plans and Surveys.—It is estimated that there will have been completed during the coming winter surveys and plans for nearly 300 additional miles of road.

Work Under Way or Projected.—There were 23 pieces of State aid work under contract in 11 counties of the State, while plans and surveys were being prepared for 48.16 miles additional at the time the report was issued. There were under way in all 98 contracts for both State and State aid work, involving an expenditure of $1,300,000, giving employment to 2500 men, and embracing the construction of 296 miles of road.

On August 1, $1,000,000 of the $3,170,000 of State road fund bonds authorized by the Percy-Goslin bill were sold. Another $1,000,000 worth of bonds will be offered for sale December 1.

Washington Boulevard.—The 5100 feet from the District line toward Bladensburg will be retarred and re-surfaced with macadam; the gap of 2900 feet through Bladensburg is being laid with concrete with a bituminous top; at Paint Branch the bridge is being straightened, the approach for a distance of 2000 feet is being widened and raised and will be covered with concrete having a bituminous surface; the re-location of 4.7 miles on the Beltsville to Contee should be open to travel this winter; the contract has been laid for Hassam concrete road 3300 feet through Laurel; the section of 4500 feet from the bridge over Patapsco River east to the B. & O R. R. crossing at Halethorpe will be done in October. A contract has been laid for 1.5 miles of pitch macadam over the B. & O. crossing at Morell Park. It is anticipated that this work will be completed this autumn except through the village of Elkridge, and about two miles northerly from the railroad crossing at Halethorpe.

Massachusetts

In Massachusetts the legislature last year voted to authorize a bond issue of $5,000,000 for State highways, beginning December 1, 1912; not more than $1,000,000 to be spent in any one year, the unexpended balance being available the next year.

Of this amount $150,000 goes into the small towns; $50,000 into towns of under $1,000,000 valuation, the towns making no contribution; $50,000 into towns under $1,000,000 valuation, the towns contributing an equal amount; and $50,000 into towns over $1,000,000, the towns contributing an equal amount.

All of this money is spent under contracts made by the Massachusetts highway commission, and under the direction of its engineers.

In addition the commission will have available 20 per cent of the net amount of the motor vehicle fees, which can be spent on through routes in the towns. The amount available from this source will be about $100,000 a year, and in many instances the towns also contribute for the same route. The towns will probably contribute $40,000 to be used in connection with this $100,000 on through routes.

The State of Massachusetts spends about $550,000 yearly for the maintenance of its State highways; $200,000 being appropriated from the State tax, and $350,000 from motor vehicle fees.

We have now 920 miles of State highway, of which about 730 miles have been either resurfaced with bituminous macadam, or have received a surface coat of tar or oil.

The State has spent some $600,000 in the so-called "small town" work in 135 towns, improving about 300 miles of road. All the roads improved in the small towns by the motor vehicle fees have been constructed of either macadam, or gravel, or sand and oil, making a good improved road.

I note that the road mileage is stated in your last book as 17,000 miles. I think that covers only the mileage in the towns, without the cities. The total mileage of the State is something over 24,000 miles.

It would be a fair statement I think to say that at least 20,000 miles of these roads were improved roads of the ordinary country road type, or better to wit: they are wide enough for two vehicles to pass, have gutters where needed on both sides, stone culverts, and were built of the best material obtainable, which in most instances had been secured from outside the location of the road. This material was very commonly gravel, and in the Cape section, sand hardened with loam and clay. They are not ideal roads, as many of them have ruts and mud puddles, and sometimes are fairly rough, but they have all been constructed, although about one-half of them have not been properly cared for and maintained. They are, however, perfectly passable roads except when the frost is coming out in the spring. It seems to me that some such statement as this would more fairly represent the Massachusetts road situation as compared with that in other States.

We have been merely turning in as improved roads only our State highways, or roads constructed equally well with 6-inch macadam, and as really improved gravel roads, only the roads which have been built to conform to our usual specifications, including proper culverts, drainage, foundation, etc., but this does not give us credit for the many excellent miles of town roads which are rapidly being improved throughout the State and that have been built for many years.

WM. D. SOHIER,
Chairman, State Highway Commission.

Michigan

Since the organization of the State highway department, July 1, 1905, up to January 1, 1913, 1737 miles of State reward roads have been built, upon which reward amounting to $1,070,000 has been paid, such amount being the total appropriation made for such purpose by the legislature.

These roads are composed of five separate classes of construction, of which gravel is the leading one, comprising about 64 per cent of the total. Macadam is second with about 31 per cent, while the remaining 5 per cent is divided about evenly among the clay-gravel, crushed stone gravel, and concrete roads.

During the fiscal year ending June 30, 1911, 304 miles were constructed; and June 30, 1912, 382 miles were completed. Since June 30, 1912, up to January 1, 1913, there has been 504 miles built, showing a greater increase than ever before in any one year.

The gravel roads of the State cost on the average about $2100 per mile and receive a $500 reward from the State. The macadam roads cost about $4300 and receive $1000 reward. The concrete roads cost about $10,000 and receive $1000 reward. The combination crushed stone and gravel about $3750 and receive $750 reward while the clay gravel, costing about $1500 receive reward of $250 per mile.

The maintenance of State roads is in the hands of the counties and townships with a State control.

The legislature has not made its appropriations for 1914 and 1915 but have been asked for $1,000,000 for those years to be used as State reward funds. Also a deficiency appropriation bill of $150,000 to finish this year has been introduced but acted upon as yet.

TOWNSEND A. ELY,
Commissioner.

Missouri

The office of State highway engineer was created by an act approved March 19, 1907. He is appointed by, and serves under, the State board of agriculture for a term of four years at a salary of $2400 per annum and necessary expenses. Deputy engineers may be appointed and their salaries fixed by the board of agriculture.

The duties assigned by law for the State highway engineer are to devise plans and estimates for road and bridge construction, best suited to the needs of the different counties of the State; to hold public meetings in the various parts of the State, and to give assistance and advice to local road officials whenever any of said officials may request it; to disseminate information and instructions by bulletins, publications, etc.; to assist in the construction of demonstration roads, and to investigate the character of the different road materials of the State. In other words, the office has no authority over road work, practically none over the distribution of the little State aid proportioned to the counties, and has since the enactment in 1907, received an appropriation of $6000 per year for maintenance of the office and to carry out the above provisions.

Referring to the duties prescribed for the office of State engineer in the order named, we find that the office, consisting of the engineer and one deputy, has during the five and one-half years of its existence, made plans and estimates by actual study and survey of the ground of about 110 miles of road at an estimated cost of $240,000, a few miles of which were superintended during construction by the office. Submitted plans and estimates for 200 concrete bridges and 120 steel structures, about 12,000 lineal feet of bridging, with an estimated cost of construction upon plans and estimates of about $550,000. We have no returns upon the contract prices of some of these and have made no effort to keep the total contract cost.

The office has responded with a personal representative to approximately 600 separate calls throughout the State upon road affairs. Fifteen bulletins upon road affairs have been issued; one upon the uses of cement upon the farm; one upon the hydraulic ram for isolated pumping plants for farm purposes; standard set of specifications for highway bridges and another for roads, revised each year and kept up to date, in pamphlet form; several circulars upon some particular matter applying to road work and a road map of the State. All this does not include the numerous inquiries answered and advice given by mail.

Machinery for testing road material was purchased in 1909 in conjunction with the Engineering School of the State University—the school and this office each paying one-half the cost. Rock and gravel was collected from each county of the State, tested, and the results issued in a bulletin of the University in September, 1911. Demonstration work, owing to the lack of funds, has been limited. Five or six small demonstrations upon concrete or the road drag and a road demonstration trip over the line of the Frisco Railroad from St. Louis across the State, by way of Springfield and Lamar (the train consisting of one baggage and four flat cars), will about complete the list.

The office has given assistance in road affairs to any reasonable request where possible to do it, regardless of whether it was a public or private road and whether aid was requested by a road official or private citizen. We have advocated uniformity in methods and work; a strict accounting for money expended; better work and more of it; construction of permanent bridges and culverts; making hard surfaced roads wherever the amount of travel justified it; attention to the earth roads and the use of the road drag; better maintenance; road bonds; cash taxes and State aid. We have especially urged State aid for we believe it to be the key to the solution of the road problem in general.

The first State aid for roads in Missouri was the equal division of the war debt fund of $475,000 among all the counties in 1907. This was given to the counties without restrictions and without any requirements upon the part of the counties to obtain it and, therefore, did not stimulate hard surfaced roadwork. The same legislature also appropriated another $500,000 to be paid to the several counties, the State paying for one-half the cost of construction, for what was designated as "permanent" work only. Owing to the shortness in State revenue not one cent of it was ever obtained for the purpose.

Since that time two enactments have become effective, each of which provide for a small revenue for State aid. The first of these is a State tax upon certain market transactions, termed the "stamp act," now giving an income of about $40,000 per year. This fund is annually disbursed to the several counties in proportion to the school attendance (just why, nobody knows) without any requirements whatever upon the part of the county receiving it, except to have a certain number of children in school. The second of these two enactments is the automobile license, now giving an income of over $100,000 annually for aid to roads. This is disbursed for the payment of one-half the cost of construction, the plans for work costing more than the rate of $1000 per mile, to be approved by the State engineer. It is an effective stimulus to road building and also an inducement for State aid.

CURTIS HILL,
State Highway Engineer.

Nebraska

At the present time the State engineer's office, which is composed of an office force of engineers both field men and draughtsmen who work under the authority and supervision of the State board of irrigation, highways and drainage, which is composed of the governor, attorney-general, and commissioner of public lands and buildings, has only had charge of the State aid bridge work.

There is a one-fifth of a mill levy levied on all the assessable property in the State, which creates a fund known as the State aid bridge fund. Also under this act the State designs, enters into contract and supervises the building of State aid bridges, furnishing one-half of the money and the county or counties in which the bridge is built furnishing the other one-half. The State board has one-half of the say of the contracts entered into, of the design and inspection. The designing, inspection, etc., is left entirely to the State engineer, who acts for and in behalf of the State board.

Counties desiring aid make application through their county board to the State engineer's office. These applications are filed and acted upon in the order in which they were received.

During the past two years twelve large bridges have been constructed in different parts of the State. These bridges are designed to be as nearly permanent as possible and designed to carry a live load of a 20-ton traction engine, or 100 pounds per square foot of floor surface.

Under this law the State pays one-half of the maintenance cost where this cost exceeds $100 per annum, so that the main object has been to secure permanent bridges on which the maintenance cost would be a minimum. The benefits derived from this plan cannot be overestimated as each of these bridges have been the very largest bridges in the State and over streams which have been hard to maintain bridges upon.

The example set has been good and it is to be hoped that it will prove an object lesson in bridge building to the different counties.

At this session of the legislature which convened on January 7, 1913, there will be presented a number of bills which have been introduced and will have as their object the creation of a State highway commission, whose duties it will be to oversee and have entire charge of all road work in the State. At this writing it is impossible to tell just what will be done and how much progress will be made in this direction, although the feeling all over the entire State is enthusiastic and seems to be for the one purpose of getting State supervision of highway work.

DONALD D. PRICE,
State Engineer.

Nevada

A law passed by the legislature of Nevada, and approved by the governor March 16, 1911, provides that the State engineer shall have general supervision of road work carried on by convict labor. An appropriation of $20,000 was made to cover the work, which was more in the nature of an experiment with convict labor than of expecting any large results from so small an appropriation. A brief outline is all that I can give you, regarding the road work under State supervision for the period of 1911–1912. The above statistics, of course, may be used to head the report.

On June 1, 1911, work was commenced on a State highway between the cities of Carson and Reno; about 1¼ miles of standard macadam road was constructed on the Carson end of the road; about 6 miles of road shaped and filled on the Reno end of the road. The type of construction used on the Reno end of the road was macadam, using a rock which was found about 5 miles from Reno and which proves to be an excellent road material. A total of about 20 miles of the road was repaired to permit of fast auto travel the entire distance.

W. W. KEARNEY,
State Engineer.

New Hampshire

Road building in New Hampshire has been divided between two classes of road. A trunk line system of three roads, running north and south through the State from the Massachusetts boundary, the route of which was selected by the legislature in a general way and by the governor and council in 1909 in detail.

The east side trunk line follows very closely the eastern boundary of the State to the point farthest north.

The west side trunk line follows in a general direction the Connecticut River on the extreme west of the State.

The third trunk line follows the Merrimack Valley through nearly the central part of the State.

For the purpose of building these trunk lines the legislature authorized a bond issue of $1,000,000 as the State's portion of such cost, the towns and cities contributing varying amounts to these roads.

By the act of the legislature authorizing these trunk lines the compact portion of the cities and larger towns was not to be considered as a portion to be built and the mileage therefore of the various roads was as follows:

	Miles
East Side	157.29
Merrimack Valley	108.73
West Side	210.97

In each of the four years, 1909, 1910, 1911 and 1912 there was available for trunk line purposes from the State's share $250,000. The towns have contributed for this building about $437,000 for 287 miles, a general average cost of $4700 per mile.

Of this construction there are 81.2 miles of macadam, including 2.5 miles of bituminous macadam and 205.8 miles of gravel, the average cost of the macadam being $7311 per mile and the average cost of the gravel being $3930.

There were 87 miles built previous to the bond issue and which were in suitable condition for maintenance so that there now remains 104.8 miles to complete the trunk line system, as laid out by the legislature. There has been expended upon State aid roads, other than trunk line, the sum of $1,475,000 upon 443 miles of road, an average of $3300 per mile.

During the last year the automobile license fee has been available for maintenance of the roads improved under State aid in New Hampshire and a sufficient sum seems to be realized from this tax, with the addition of the towns contribution, to maintain the roads properly and in good condition.

There are 130 miles of State roads, however, which were taken over by legislative enactment without suitable sums for their construction and the result is that this class of road is almost impossible to maintain in good condition for travel. They are largely in the mountains and subjected to an immense amount of tourist travel and a number of these roads are continuations of or contained in the trunk lines and some provision must undoubtedly be made in the near future for the proper construction of these roads.

S. PERCY HOOKER,
State Superintendent of Highways.

New Mexico

The awakening of a new interest in "Better Roads" in New Mexico began during the year 1909 when the legislature passed an act creating a territorial road commission, consisting of the governor, the commissioner of public lands and the territorial engineer, who were authorized to conduct investigations and build demonstration roads in different parts of the territory; also to select and construct a system of prospective State highways, and to coöperate with the various boards of county commissioners in the construction of roads and bridges.

In order to provide means for carrying on this work a tax levy of 1 mill on every dollar of taxable property in the territory was authorized, thus constituting a road fund of between $50,000 and $60,000 a year, and in 1912 an automobile license law increased this amount by about $10,000. Also in this same year a State bond issue of $500,000 was authorized and voted on at the November election and was carried by a large majority. This will enable the highway commission to build some first class roads when the money becomes available from the sale of these bonds in July, 1913.

The new laws of 1912 provide that the name of the territorial road commission shall be hereafter known as the State highway commission, the personnel remaining the same but with greatly increased authority, giving them general supervision over all the road and bridge work in the State.

Previous to 1910 most of the roads in New Mexico were impassable for an automobile, and except near the settlements it was a problem to get through with a wagon. The principal road construction done by the highway commission has been to get a good earth road connecting the larger towns in the State, but more particularly to get one through road across the State to take care of the transcontinental automobile tourists who will find this the most interesting route to the Pacific coast.

At the present time the highway commission has a prospective system of highways totaling 1113 miles. Of this 385 miles is now constructed, and 320 miles of old roads improved, while 408 miles remain to be built to connect up this system. The roads built may be classified according to the general character of the work done as follows:

	Miles
Heavy mountain, solid and loose rock, 14 to 16 feet width	30
Medium mountain, loose rock and earth, 18 feet width	75
Road grader, earth, 18 feet with 3-foot ditch on sides	207
Scraper fill grade, 16 feet	18
Gravel surfaced, 16 feet by 6 inches	7
Sand-clay, 16 feet by 10 inches	48
Old road improved	320
Total	705

Until the present year no close record of cost data had been kept but the cost of the above roads averaged about as follows:

	Per mile
Heavy mountain work	$2000
Medium mountain work	1000
Road Grader	50
Scraper fills work	700
Gravel surfaced work	1200
Sand-clay	1200
Old roads improved	20

From 1909 to the beginning of 1912 the highway department had built and improved 460 miles of road at a cost of $162,055.50. The average for this work was $352.00 per mile. During 1912, 245 miles were built at a cost of $78,613.88, being an average of $321 per mile. Below is a classification of expense with percentages shown.

1909 to 1912

ENGINEER	SUPERINTENDENCE	LABOR AND TEAMS	MATERIAL	MACHINERY AND TOOLS
$10,241.79 0.0632%	$12,963.35 0.0799%	$113,888.36 0.7028%	$10,123.00 0.0625%	$3,453.38 0.0213%

During 1912

$4,390.01 0.0559%	$5,925.60 0.0750%	$55,623.83 0.7080%	$6,519.91 0.0821%	$803.89 0.0120%

1909 to 1912

BRIDGES AND CULVERTS	TRAVELING EXPENSE	RIGHT OF WAY	GENERAL EXPENSE	TOTAL EXPENSE
$3,981.96 0.0246%	$4,933.92 0.0305%	$98.30 0.0006%	$2,371.46 0.0146%	$162,055.50 100%

During 1912

$1,185.32 0.0140%	$863.18 0.0110%	$5.00 00%	$3296.14 0.0420%	$78,613.88 100%

With the large increase in the road fund in 1913 the highway department expects to build a number of miles of gravel and macadam roads. Near the towns the road sections will be graded 20 feet wide with 16-foot metal surface, while in the country a 15-foot grade with an 8-foot surface will be built. Several hundred corrugated iron culverts of American ingot iron have been installed, but preference is given to concrete and that type will be used wherever possible. The iron culverts, being easily installed and light to haul, are most economical at points distant from railroads, as in some cases the cement for concrete would necessarily have to be hauled 75 miles and the water from 8 to 10 miles.

The county road work which, previous to 1912, had been under the supervision of the boards of county commissioners was placed in charge of county road boards, the members of which serve without compensation and consist of three taxpayers who shall be appointed by the State highway commission for a period of three years and subject to removal by the commission for cause. Members of the first board to be appointed for periods of one, two and three years respectively, and not more than two of them shall be of the same political party at the time of their appointment.

The county road boards are authorized to plan and construct a system of county and inter-county roads, subject to the approval of State highway commission. Bridges as well as roads must be built by them according to standard plans and specifications approved by the highway commission.

Revenue for county road work is raised in the following manner:

Road Tax.—By a road tax of $3 paid in cash or labor.

County Tax.—The boards of county commissioners may levy a tax for road purposes, which shall not exceed 3 mills on the dollar of taxable property in the county.

Special Levy.—Where one hundred legal voters and regular tax payers shall petition in writing the board of county commissioners, demanding that a special levy be made for the purpose of improving roads and bridges, may at their discretion, levy a tax of not to exceed 1½ mills upon the assessed valuation of such county.

Bond Issue.—Whenever there shall be filed with the board of county commissioners a petition signed by not less than ten per centum of the qualified electors who are tax payers, asking for an issuance of bonds for the purpose of construction and repair of roads and bridges in the county, they shall call a special election, and if at the said election, a majority of the votes cast are in favor of the bond issue, the board of county commissioners are authorized to issue bonds to an amount, which, including the existing indebtedness of said county, shall not exceed four per centum of the taxable property of such county as shown by the last preceding assessment for State and county taxes.

State prisoners have been used for several years on the construction of about 30 miles of the heaviest mountain roads. On this class of work, where it was necessary to use hand labor and the men could be worked closely together, very good results were obtained and the work economically done. Also the healthful outdoor life and hard labor better fitted them for earning a livelihood when released.

The personnel of the State highway commission at this time is: Governor W. C. McDonald, chairman; Robert P. Ervein, land commissioner; and James A. French, State engineer.

JOHN D. MERIWETHER,
State Road Engineer.

New York

The State superintendent of highways reports the status of highway improvements to December 1, 1912, in New York as follows:

State highways and county highways now improved, 3578 miles. State highways and county highways now under contract, 1627 miles, expedited routes not contracted for but the construction of which was contemplated in the expediting bills of 1910–11, 298 miles; remaining State highway and county highway to be improved, 6483 miles; total, 11,986 miles. Of the town highways to date there have been macadamized 3514 miles; improved as gravel roads, 8500 miles; shaped, crowned and standardized as to width 50,000 miles; put in safe condition for travel, 6000 miles; total 68,014. Total mileage of public roads in the State of New York, 80,000 miles.

Status of Funds.—All of the original $50,000,000 bond issue has been appropriated and is accounted for as follows: original authorized bond issue highway improvement fund, $50,000,000; expended appropriations to January 1, 1912, $22,188,593.56; balance unexpended January 1, 1912, $27,811,406.44; expended for all purposes from highway improvement fund to December 1, 1912, $8,073,157.58; remaining from previous appropriations unexpended December 1, 1912, $19,738,248.86; appropriation, chapter 247, laws of 1912, available October 1, 1912, $1,045,000, balance unexpended, salary appropriations reverting to highway improvement fund October 1, 1912, $27,372.24, comptroller's balance, highway improvement fund, December 1, 1912, $20,810,621.10.

Obligation.—Balance due on contracts not expedited December 1, 1912, $8,455,810.58; elimination of grade crossings ordered to date, $199,733.49; balance original bond issue not obligated December 1, 1912, $284,518.03; balance due on contracts for expedited routes December 1, 1912, $9,447,546.91; balance available for expedited routes not under contract December 1, 1912, $2,422,972.09; total, $20,810,621.10.

1912 Construction.—During the calendar year there have been placed under contract 1,003 miles of State highway and 517 miles of county highway, and there has been completed a total of 662 miles. Of this State highway mileage let 871 miles are on the so-called expedited routes provided for in the laws of 1910–11. The appropriations for these expedited routes were inadequate to effect a proper type of construction and must be supplemented by the present legislature in order to insure their completion. There remain 298 miles of these routes to be built for which only $2,422,972.09 is available or an average of $8,130.78 per mile, which is not sufficient to provide a type of construction consistent with their importance.

Maintenance in 1912.—The bureau of maintenance has resurfaced, repaired and oiled, 1215 miles and has covered approximately 3000 miles under the patrol system. This bureau will have charge of upward of 4000 miles in 1913 by reason of the addition of this year's construction.

Bureau of Town Highways.—The bureau of town highways during the calendar year has expended under its supervision $1,665,500 as State aid to the towns throughout the State, which combined with the local highway tax raised by the towns makes a total of $4,972,888. The work done by this bureau is of increasing importance and is reflected by the annual increase in the amount raised throughout the State by tax to be supplemented by State aid.

Work Done by the Present Commision.—The former highway commission assumed office on February 17, 1909, and took over from the State engineer 543 miles under contract and during the 29 months of its existence placed under contract 1050 miles and completed 718 miles. The present commission assumed office on July 17, 1911, and took over from the former commission 875 miles under contract and in 17½ months has put under contract 1847 miles, has completed 1152 miles and now has under contract 1570 miles. Thus the present commission in about one year's less time than the former commission has placed under contract 76 per cent more miles and has completed 56 per cent more miles. It has plans and estimates ready for approximately 700 miles of improvement and surveys and plans are in the course of preparation which will make a total of approximately 900 miles ready for the spring letting when the new funds are available.

North Dakota

The office of State engineer was created in the legislature of 1905, but up to the present time no jurisdiction over the highways of the State has been given to him by law, other than that of supervising the construction of experimental roads with convict labor at the penitentiary. A bill providing for the above was passed by the legislature of 1909, but very little has been accomplished in this work.

The State engineer also is authorized to give the county superintendents of highways advice when called upon. The 1911 session of the legislature passed a bill making the appointment of a county superintendent of highways optional with the county commissioners. This law resulted in the appointment of five county superintendents as follows: Billings County, Thor G. Plomasen, Beach; Burleigh County, John Ecklund, Wilton; Dickey County, Sol Hunter, Oakes; Griggs County, Martin A. Ueland, Cooperstown; Stark County, W. R. Veigel, Dickinson.

In some of the counties where county superintendents have been appointed the conditions are much better than under the old system, but owing to the fact that the bill was passed making the appointment of the deputies to the county superintendent to be approved by the township supervisors, the results obtained in a few counties have not been much better than under the old system.

An automobile license law was passed at the 1911 session of the legislature, which provides that the funds derived from the licensing of motor vehicles should be returned to the counties from which it originated to be expended upon the main traveled roads of the county for maintenance, under the direction of the county superintendent of highways where county superintendents have been appointed, or under the direction of the county commissioners where county superintendents are not appointed. The law also provides that none of this money shall be expended in any township which does not levy a tax of at least 6 mills for road purposes. The net proceeds returned to the counties from this fund amounted to $17,661 in 1911, and to $22,800 in 1912.

North Dakota is prohibited by the constitution from granting State aid in highway construction, but the constitution is in process of amendment, and if it carries by the vote of the people at the general election in 1914, laws providing for the levying of a tax for a State aid fund may be passed at the 1915 session of the legislature. The people of the State are becoming better educated to the value of good roads, and it is anticipated that not only will the constitutional amendment pass, but it is believed that a law providing that all highway taxes shall be paid in cash will be passed at the 1913 session of the legislature, and that the county superintendent law will be strengthened, and possibly a highway commission appointed.

T. R. Atkinson.

Ohio

I am enclosing herewith a statement of the appropriation of this department since its organization, also a statement of the number of miles of road completed by years, with the cost of same.

The work of maintenance has been very limited as this bureau was established but one year ago and no appropriation has been made to meet the expense of the department.

James R. Marker,
State Highway Commissioner.

Total Contracts Let

DATE	MILES	TOTAL CONTRACT PRICE
1905–1906 none.		
1906–1907	33.08	$223,981.69
1907–1908	27.80	229,599.46
1908–1909	63.01	534,945.77
1909–1910	72.67	626,574.18
1910–1911	60.88	455,419.11
1911–1912	85.19	1,391,233.65
Totals	342.63	$3,461,753.86

Total contracts completed
First appropriation became available February 15, 1905

DATE	MILES	TOTAL COST
1905–1906		
1906–1907	1.00	$11,177.17
1907–1908	24.10	180,433.06
1908–1909	32.05	253,465.92
1909–1910	47.70	368,982.04
1910–1911	50.83	508,921.54
1911–1912	79.96	659,882.47
Totals	245.64	$1,982,862.20

Total contracts completed from November 15, 1911, to November 15, 1912

TYPE	TOTAL MILEAGE	TOTAL COST	AVERAGE COST PER MILE
Brick	19.96	$292,459.37	$14,652.22
Concrete	2.38	18,365.00	7,716.34
Bituminated concrete	1.61	12,285.00	7,630.42
Concrete and macadam	3.10	21,725.00	7,008.06
Waterbound macadam	39.77	237,640.49	5,975.12
Bituminous macadam	9.68	66,338.61	6,842.82
Gravel macadam	3.46	11,069.00	3,199.13
Totals	79.96	$659,882.47	

Statement of appropriations by years from 1905 to 1912 inclusive

YEAR	GENERAL APPROPRIATION	AUTOMOBILE LICENSE FUND	TOTAL	AMOUNT DISTRIBUTED TO EACH COUNTY
1905	$10,000		$10,000.00	$113.63
1906	150,000		150,000.00	1704.54
1907	150,000		150,000.00	1704.54
1908	440,000		440,000.00	5000.00
1909	440,000	$46,577.75	486,577.75	5529.29
1910	440,000	118,654.32	558,654.32	6348.34
1911	440,000	160,366.73	600,366.73	6822.34
1912	440,000	220,000.00	660,000.00	7500.00
Totals...	$2,510.000	$545,598.80	$3,055,598.80	$34,722.68

Pennsylvania

The Pennsylvania legislature at its last session passed a highway act commonly known as the Sproul road law, carrying with it a $3,000,000 appropriation. This act called for a reorganization of the then existing State highway department, and provided for a State highway commissioner, two deputy highway commissioners, a chief engineer, a bridge engineer, fifteen assistant engineers, fifty superintendents, a chief clerk, an auditor, draftsmen, etc., and further provided for the taking over on June 1, 1912, a system of highways to be known as State highways, these roads comprising 296 specified routes, which form connecting links between county seats and principal cities and towns. The act likewise called for the completion of State aid contracts let under previous acts, improvement of township roads by State aid contracts to the extent of $2,000,000, 50 per cent to be paid by counties or townships, and the remaining 50 per cent or $1,000,000 be paid out of an appropriation of like sum, the surveying of all highways within the borders of the State and the maintenance of State highways built under present or previous acts of legislature.

The first provision authorizing the reorganization of the State highway department, was taken up on the first day of July, 1911. The State was divided into fourteen districts, with headquarters established as follows: District no. 1 consisting of Center, Clearfield; Clinton and Indiana counties, with headquarters at Clearfield; District no. 2, consisting of Dauphin, Juniata, Lebanon, Perry and Mifflin Counties, with headquarters at Harrisburg; District no. 3, consisting of Columbia, Luzerne, Montoue, Northumberland, Snyder and Union Counties, with headquarters at Bloomsburg; District no. 4, consisting of Armstrong, Butler, Clarion, Jefferson, Lawrence, Mercer and Venango Counties, with headquarters at Franklin; District no. 5, consisting of Berks, Carbon, Lehigh, Northampton and Schuylkill Counties, with headquarters at Allentown; District no. 6, consisting of Adams, Lancaster and York Counties, with headquarters at York; District no. 7, consisting of Bucks, Chester, Delaware and Montgomery Counties, with headquarters at Philadelphia; District no. 9, consisting of Cumberland, Franklin and Fulton Counties, with headquarters at Harrisburg; District no. 10, consisting of Bradford, Cameron, Lycoming, Potter, Sullivan and Tioga Counties, with headquarters at Wellsboro; District no. 11, consisting of Bedford, Blair, Cambria, Huntingdon and Somerset Counties, with headquarters at Hollidaysburg; District no. 12, consisting of Lackawanna, Monroe, Pike, Susquehanna, Wayne and Wyoming Counties, with headquarters at Scranton; District no. 13, consisting of Allegheny, Beaver and Westmoreland Counties, with headquarters at Pittsburgh; District no. 14, consisting of Fayette, Greene and Washington Counties, with headquarters at Washington; District no. 15, consisting of Erie, Elk, Crawford, Forest, McKean and Warren Counties, with headquarters at Warren.

By July 1, 1912, 95 per cent of the 8798 miles of State highways created by Sproul road act had been surveyed, and all information gathered to make complete maps and estimates as to cost of construction. At the present time all surveys have been completed and a large number of the county maps showing the complete surveys of all roads in each county together with the towns, villages, and other important points or places, have been published and are now on sale at the cost of publication. Maps of Pennsylvania showing State highways adopted under the Sproul road bill are on file and can be secured upon application free of charge.

How well the maintenance work has been carried on during the six months between June 1, and December 1, 1912, may be evidenced by the fact that upon closing down of the work on December 1, 6009 miles of the State highways had been gone over and put in first class condition, 138 miles had been resurfaced with limestone, and 72 miles entirely reconstructed, either with bituminous macadam or asphaltic concrete. One hundred miles of State aid roads contracted for under previous acts were completed and 43 miles constructed under State aid provision of the Sproul road law. All roads constructed being of brick, concrete, bituminous macadam, or macadam, depending upon the location, and in all cases being 16 feet in width. Stretches of experimental roads were constructed in several portions of the State, various kinds of construction being used and the experience gained from these roads will be used in directing future policies of road building by the State highway department. Considerable work has also been done on the National Road running through Washington, Fayette, and Somerset Counties. It is the aim of the department, as rapidly as time and funds will permit to make this road in every respect a model one embracing the most approved methods of road construction.

Along all the State highway routes, at cross and intersecting roads, iron sign posts and signs are being placed, giving the direction to towns or villages, and other necessary information.

STATE HIGHWAY DEPARTMENT.

Rhode Island

At the close of the year 1912, there were 294 miles of State road under the direct care and up-keep of the State board, and widely distributed among each of the several towns of the State.

Of the above named mileage, 43 miles—standard width, 14 feet—were built during the past season, composed of 35 miles of bituminous pavement and 8 miles of water bound macadam.

Beside the new construction above named, the equivalent of 23 miles, standard width, of old and much worn water bound macadam, were rebuilt from the foundation with bituminous pavement, making a total of 66 miles, standard width, of practically new construction built during the past year, but inasmuch as a few miles of the new construction, and most of the reconstruction, were built from 16 to 28 feet wide, the actual lineal mileage of all widths built, was approximately 63½ miles, making the past year a record breaking season for road building, far in excess of the construction work of any previous year.

The extra widths above named on reconstruction work were built at the time of the original construction and then paid for by the towns, thereafter; the law requires that the full width must be maintained by the State.

For the first time during the period of our work, use was made of the heavier oils in caring for an old macadam surface. A section of 4.1 miles of old and badly worn water bound macadam, after extensive patching, was flushed with a 90 per cent oil, then sanded and rolled. Another section of 8 miles, water bound, was served in a similar manner with a 60 per cent oil, except that the oil and sand were mixed at the gravel pit before being taken in carts and spread upon the road.

The balance of all water bound macadam, in all parts of the State, was flushed with a light 40 per cent oil and sanded, and much of it received a second flushing later in the season. The two lighter oilings covered the surface of 308.63 miles, or 2,534,718 square yards at a cost of 1 cent per square yard, a total cost of $25,347.18.

STATE BOARD OF PUBLIC ROADS.

South Dakota

The State engineer reports for the calendar year 1912 as follows: There is no provision in the State for State aid or control of highways; total mileage of roads located on section lines aggregate 65,000 miles; public interest in South Dakota has become concentrated on several important trunk line roads which may be designated as the Meridian Road or Winnipeg to Gulf Highway; the Chicago, Black Hills, Yellowstone Park to Coast Highway; the South Dakota Scenic Highway; the Aberdeen-Mobridge Road; the Watertown, Redfield, Gettysburg Road; the Sioux Falls, Salem, Iroquois Road; the Sioux Falls, Brookings, Milbank Road; and the Sioux City, Platte, Chamberlain Road. It is proposed to utilize existing roads as far as practicable and the program contemplates the construction of good earth roads.

Washington

The report of the State highway commissioner for the period ending September 30, 1912, states that the office of highway commissioner was established in 1905, prior to which time $120,000 had been expended on State roads without direct supervision.

In the eight years since the office was created the State has built about 200 miles of State roads at a cost of $1,000,000, has aided the counties in building 145.76 miles of State aid roads at a cost of $1,136,198.58, and is now engaged in supervisory work in all but five of the thirty-nine counties on permanent highways under the new law. For this latter purpose, and to complete existing contracts under State aid, $1,230,000 was appropriated for the current biennium, and with few exceptions the counties will use the entire funds to their credit. There have been 169 miles either partially or entirely built under this law, the character and cost ranging from light grading in natural gravel at a cost of $1500 per mile, to the better roads with heavier grading and with concrete bridges, grading and bridges costing $10,000 a mile and paving an additional $10,000 to $15,000 a mile.

The value of good roads to the State of Washington will be better understood when it is known that the 56,000 farms of Washington yield 5,000,000 tons of produce annually, which is hauled over the roads an average of 8 miles from farm to shipping point. It is estimated that at least $6,000,000 a year may be saved in transportation on farm products by better roads in Washington.

One-third of the taxes collected in the State outside incorporated towns is spent upon roads. Hence, the need for intelligent treatment of the road problem.

The permanent highway law, is proving satisfactory in securing more permanent roads in the place of temporary construction.

The one mill levy under the law yields about $1,000,000 a year and this assures at least 100 miles of permanent highway each year.

More than $10,000,000 have been expended on roads and bridges in Washington the last two years. This may be distributed as follows: Under highway commissioner—State roads and bridges and office expense, $241,700; State aid roads and permanent highways, $1,230,000. County supervision—county roads and bridges $3,360,186.92; district and township roads, $4,712,594.75; district assessments, $75,998.35; donations and private, $300,000; sale of bonds (Pacific County) $100,000. Federal government—Rainier Park, $36,228.71; military reserves, $32,000; Indian reservations, $12,000. Railroads, steam and electric, to replace roads appropriated for right-of-way (estimated), $100,000. Total, $10,200,708.73.

Wisconsin

The new era in road work in Wisconsin may be properly divided into two periods:

The first period began in 1907 with the creation of the highway division, under the direction of the State geological survey. An annual appropriation of $10,000 was made by the legislature, and with this money an educational campaign was carried on throughout the State by distributing literature, furnishing speakers for farmers' institutes, and building demonstration roads in different parts of the State. This work was carried on for four years under the supervision of a road and bridge engineer, and may be termed the educational period in the evolution of a new era in road work in Wisconsin.

The second period began in 1911, with the creation of the Wisconsin highway commission, the period of actual construction. The new law created a non-salaried commission, consisting of three members appointed by the governor, and of two ex-officio members, to consist of the State geologist and the dean of the College of Engineering. The personnel of the commission at this time is: John A. Hazelwood, Jefferson, chairman; John S. Owen, Eau Claire; J. H. Van Doren, Birnamwood; W. O. Hotchkiss, State geologist, Madison, and F. E. Turneaure, dean of the College of Engineering. A. R. Hirst is State highway engineer, and M. W. Torkelson, bridge engineer.

The law provided for an appropriation of $350,000, annual highway fund, and $40,000 annually for expenses of administration. For the first fiscal year (1911–12) which was the first year of operation under the new law, every county except eight out of seventy-one counties took advantage of the opportunity for better roads, built under the direction of experts employed by the State, and participated in the appropriation offered.

The central principle of the new law provides that whenever a town at a regular or special meeting appropriates a sum of money to the amount of $400 or more, the county is compelled to raise an equal amount, and the State will then add the other one-third. Under the new law, a town raising $400 for roads will have $1200 to spend on road work that year, the town, county and State each furnishing one-third of this amount. In the matter of State aid bridges, the town and county each raise two-fifths, and the State the remaining one-fifth.

Cities and incorporated villages are exempt from the benefits of State aid; so that the whole attention of the State commission is given to the work in the towns constituting the county system of highways. Under the law, each county has outlined a system of prospective State highways, which, after approval by the State highway commission, constitute the system of roads that may receive State aid. The work in each county is under the immediate direction of a county highway commissioner elected by the county board for three years, the surveys, plans and specifications and final supervision being furnished by the State highway commission.

For the first year's work (1911–12) out of 1195 towns in the State, the commission received applications for State aid from 532 towns. Five hundred and eleven towns voted a total of $422,200 for roads and 125 towns voted $55,100 for bridges. This represents work for 1911–12, amounting to an outlay of $1,350,000 in round numbers.

During the first year of operation under the new law, the commission made 650 miles of surveys. Three hundred miles of surveys for the 1913 work have already been made; so that work can commence promptly in each county as soon as the season for road work opens next year. The road built in 1912 was distributed as follows: Stone macadam, 140 miles; gravel macadam, 110 miles; shale, clay and other surfacing, 35 miles. These are approximate figures of the total work completed, a total for the year of about 500 miles.

The character of the work done is chiefly gravel surfacing and stone macadam. Concrete roads are fast finding favor. In 1913 many miles of concrete road will be constructed. The standard width of the great percentage of roads built by the commission is 9 feet, which is found to be the most economical, enabling the towns to build a greater length of road for the money at their disposal, and at the same time to meet all the requirements of ordinary country travel.

The bridge work of the commission is important in a State where perhaps one-half of the expenditures on highways is spent on bridges. The bridge work of the commission for 1912 was as follows: 140 State aid bridges were built at a cost of $111,355.59, and 128 county aid bridges, approved by the commission, and costing $198,983.59, making the total amount spent in the construction of State and county aid bridges in 1912 $310,339.08.

The work for 1913 shows an increase of 100 per cent over that of 1912. At the spring election, 883 towns voted $811,150. Of this amount, $757,273 was voted for roads by 865 towns, and $107,754 was voted for bridges by 205 towns. The number of bridges to be built in 1913 is 337, and the number of miles of road to be built is 1000. The plans for 1913 work represent in round numbers an outlay of $2,500,000.

From the outline given above, it will be readily seen that the towns and counties of the State have accepted almost unanimously the opportunities afforded by the new law for a better class of roads. The fact is that the people have responded so liberally that the State appropriation for 1913 ($350,000 plus $28,000 from the automobile fund, amounting in all to $378,000) is totally inadequate to meet the demands of the towns and to pay the one-third promised by the State. About $450,000 more is necessary, and it is expected that the next legislature will make an additional appropriation to cover this amount.

It is also expected that the new legislature will strengthen the law in several respects and appropriate at least $1,000,000 annually for the support of the State highway fund. If this were done it would mean an expenditure in both 1913 and 1914 of approximately $3,500,000.

William Dawson,
Chief Clerk.

Wyoming

The State legislature which met in 1911, designated several roads aggregating over 2000 miles which were described as public highways, and provided for the employment of State convicts in the construction of such highways. A State commission on prison labor was also created, under whose authority the construction, repair and maintenance of certain highways shall be done by convict labor. The work of locating, surveying and making plans and specifications, as well as inspecting the construction of these roads was placed under the direction of the State engineer. As the State had previously not been directly interested in the construction of roads, it was impossible to accomplish anything during 1911, aside from determining in a general way how to carry out the provisions of the statutes.

The State commission on prison labor made plans for the employment of convicts in two counties, and purchased such equipment as was possible, with the limited appropriation available. As there was no appropriation for the making of the necessary surveys, etc., it was necessary for the State engineer to secure the co-operation of the various counties through which the roads were to pass. In nearly all counties, the county surveyor was directed by the county commissioner to make the necessary locations under the instructions of the State engineer. It was necessary for the State engineer to make several trips into the field to investigate the most feasible route in several instances, but aside from this, no field work was done directly by the office.

The first route to receive attention was the Yellowstone Highway, which crosses Wyoming from the southeast to the northwest. This highway begins at the State line on the road between Cheyenne and Denver. It has been located through Laramie County and Converse County, and in Natrona County to a point near its western boundary, where the location prescribed in the statutes is not practicable. The road has also been located from the southeastern part of Park County to the Yellowstone Park, which is the western terminus of the road which connects with the system of government roads in the Park. The road is passable for all kinds of vehicles during good weather, there being a few places however, where difficulty may be encountered during continued wet weather. Between 35 and 40 miles of this road have been placed in excellent condition by convict labor. This road furnishes a very convenient route for reaching the Yellowstone Park by automobile, as there are fairly good roads connecting the located portions of the highway.

The Transcontinental Highway which crosses the State from east to west, following closely the line of the Union Pacific Railroad, has been located for its entire length, although in a few places alternate locations have been made, and the final location not determined upon. This road has been improved to a considerable extent during the last year, and is not being used by many parties who are making a transcontinental trip by automobile, as it has easy grades and is at all points close to the railroad, and follows a route along which supplies can always be had.

Several routes into the famous Jackson's Hole have been investigated. There are several feasible routes up Green River from points on the Transcontinental Highway. These all connect in the upper part of the valley and then cross the mountains into Hoback River Canyon. The road through the canyon is being improved by the Forest Service, and will be open to travel by the middle of July, 1913.

A north and south road from Rawlins on the Transcontinental Highway to Sheridan in the northern part of the State is being investigated. That part of the road north of Casper has been located and considerable money spent in improving the grades and crowning the roadway, as well as building bridges and many culverts wherever necessary.

Where convicts have been used, they were furnished by the State, but the expense of maintaining the convict camps was made by the counties. Very little accurate information regarding the cost of building the roads is available. It is reported however, that the cost of building concrete culverts with convict labor is about the same as for building wooden culverts by day labor. For one gang, the cost to the county was about 4 cents an hour. The expenditure for another gang which constructed 12 miles of road beginning in May and ending in October is as follows:

Provisions, meats, groceries, etc.	$2,094.61
Overseers, engineers, guards, etc.	915.16
Horse hire	756.00
Cement, lumber, etc.	1,188.74
Culvert forms, wagons, tents, and other camp equipment	1,215.60
Total	$6,170.10

The cost per mile on first 12 miles, $412.88. This includes the cost of 51 culverts, the largest being 50 inches in diameter, and 52 feet long. All roads built up to the present time have been earth roads, which have been crowned and side ditches built to take care of the drainage. The cost of making the location and surveying one piece of road 33 miles in length, of which 21 miles was new location, amounted to approximately $14.00 per mile.

A. J. Parshall,
State Engineer.

HIGHWAY OFFICIALS

Office of Public Roads, United States Department of Agriculture.—Logan Waller Page, director; Paul D. Sargent, assistant director; Vernon M. Peirce, chief engineer; C. S. Reeve, chemist; Albert Goldbeck, testing engineer; W. C. Wyatt, chief clerk.

Alabama

State Highway Commission.—Robert E. Spragins, chairman; John Craft, V. B. Atkins, Dr. Eugene A. Smith, professor of geology, University of Alabama; G. N. Mitcham, professor of engineering, Alabama Polytechnic Institute; W. S. Keller, State highway engineer, Montgomery; R. P. Boyd, assistant State highway engineer.

County commissioners or boards of revenue elected by the people of each county in November of even years, have supervision over the roads. They divide the county into road precincts and appoint apportioners, who in turn appoint a road overseer for each precinct.

A county supervisor of roads to receive not more than $5 per diem, may be appointed by county commissioners, and, in acts allowing bond issues, it is usual to provide that county commissioners may appoint an engineer and fix his salary.

Alaska

Road work is under supervision of board of road commissioners of Alaska, composed of officers of the corps of engineers, U. S. A., upon whose recommendations appropriations are made by Congress.

Lieutenant-Colonel W. P. Richardson, U. S. A., president of board; Lieutenant Glen E. Edgerton, C. E., U. S. A., engineer officer.

Arizona

Lamar Cobb, State engineer, Phoenix.

County superintendents of roads elected by the people, have charge of road work. Last election December 12, 1911, term expires December 31, 1914.

Arkansas

County judges elected in September of even years, and who take office November 1, have control of highways, but there are many special laws affecting localities.

California

State Highway Commission, Sacramento.—Burton A. Towne, Lodi; Charles D. Blaney, Saratoga; Newell D. Darlington, Los Angeles.

Austin B. Fletcher, recently of San Diego, formerly the secretary and chief executive officer of the Massachusetts highway commission, is the highway engineer and executive officer of the commission. Wilson R. Ellis of Berkeley is secretary of the commission.

County supervisors, of whom there are five in each county, elected for a term of four years in November of even years, have authority over roads. The county surveyor is elected.

Colorado

State Highway Commission, Denver.—C. P. Allen, chairman; W. M. Wiley, Thos. H. Tully, J. E. Maloney, secretary and engineer.

County commissioners of whom there are three in each county elected by the people in November of even years for two, four and six years respectively, have jurisdiction over local roads.

General road overseer for county may be appointed by county commissioners or district overseers for districts.

Board of directors is appointed in each Corporate Road District formed after petition of voters.

Connecticut

State Highway Commission, Hartford.—James H. MacDonald, Hartford, State highway commissioner; E. H. Kelsey, Deputy highway commissioner.

Division Engineers.—R. S. Hulbert, Winsted; W. H. Knight, Sharon; E. C. Welden, Scotland; James A. McElroy, Bridgeport; R. G. Pike, Jr., Middletown; C. A. Campbell, New London; F. Walden Wright, Putnam; George E. Smith, New Haven.

Selectmen of towns have jurisdiction over local roads.

Delaware

New Castle County Levy Court.—John W. Dayett, president, Cooch's Bridge; Henry W. Perkins, Wilmington; Samuel J. Dennison, Wilmington; Isaac C. Elliott, Wilmington; W. Frank Taylor, Hockessin; Daniel Thompson, Newark; James A. Buckson, Blackbird; James Wilson, county road engineer.

New Castle County State highway commissioner, James Wilson, who is a State official, and has charge only of the building of improved roads.

There are ten Hundreds (townships) in this county outside of the city of Wilmington in each of which there is a road supervisor who does work on the common roads under the direction of the county road engineer, by whom all bills must be approved before they are paid by the levy court. All money spent on the Hundred roads is raised in the Hundred in which it is spent, by a tax levy made by the levy court. The present rate is 40 cents on $100.

Kent County Levy Court.—James T. Truax, Smyrna; Thomas V. Keith, Dover; Charles Sherwood, Cheswold; John W. Virdin, Kenton; Benjamin Donoho, Dover; William M. Hughes, Felton; George H. Gooden, Woodside; Nehemia Cain, Felton; David T. Booth, Harrington; John P. Carmean, Milford.

Kent County State highway commissioner, C. B. Hope, Dover. The levy court commissioners appoint "overseers" for the purpose of *working* the roads, as many as "15 or 20" are appointed for each district.

Sussex County.—County road engineer, William J. Mustard, Georgetown, who has supervision over the "general road fund" amounting to $17,000 for the county and he appoints two supervisors for each of the ten representative districts. There is no Sussex County State highway commissioner.

The road law is practically the same as in New Castle except that the county is not authorized to issue bonds for building roads.

District of Columbia

Engineer commissioner in charge of all public work, Maj. Chester Harding, U. S. A.; surface division is in charge of Captain Mark Brooke, U. S. A., assistant to the engineer commissioner; engineer of highways, Mr. C. B. Hunt.

Florida

County commissioners of whom there are five in each county, elected in November of even years, for two year terms, have supervision of roads.

Three road commissioners must be appointed annually by the county commissioners for each road district.

A road overseer must be appointed by the road commissioners for each subdivision of road districts.

Where the voters elect to have their road district a special tax road district they elect at the same time three trustees to supervise the road work of the district.

Georgia

Georgia has no State highway department but the geological survey collects and publishes data on roads. Dr. S. W. McCallie is the State Geologist.

State prison commission has authority over convict labor, which is utilized for road improvement. Mr. R. E. Davidson, Atlanta, is the chairman of the commission.

Board of county commissioners three to five members, have jurisdiction of roads and must divide county into road districts. Three road commissioners are appointed for each road district and these appoint overseers.

Idaho

State engineer, A. E. Robinson, Boise.

State highway commission consists of the governor, the State mining inspector and the State engineer.

Boards of three county commissioners, elected for two year terms in January of odd years, have jurisdiction except in counties which have been organized in good road districts. In districts organized upon petition of residents three highway commissioners are elected in November for a term of four years, the next election to be in 1915. They appoint a director of highways who must be an experienced road builder.

Illinois

State Highway Commission, Springfield.—Dr. E. J. James, chairman; Joseph R. Fulkerson, Lafayette Funk, A. N. Johnson, Springfield, State highway engineer.

In counties having township organization three township highway commissioners elected by the people, have jurisdiction one of whom is elected in April of each year, and may employ general superintendent, overseers, et al. In counties not having township organization, county boards of commissioners, elected by the people, divide county into road districts, in each of which three highway commissioners and one clerk are elected, and these may appoint general superintendent, overseers, et al.

Indiana

Three county commissioners in each county, one commissioner elected in November of each year, have supervision over roads. They are also ex-officio a board of directors for all free gravel, macadam and turn pike roads and may appoint a superintendent for each ten to fifteen miles. They also appoint superintendents of construction for gravel roads built by assessment of contiguous property.

Boards of township trustees elected in November every four years divide the township into road districts and a supervisor is elected every odd year in December in each road district.

Iowa

The Iowa State College of Agriculture acts as a State highway commission.

Highway engineer, T. H. MacDonald, Ames.

County board of supervisors elected by people (three to seven members) control county work, bridge funds and portion of road funds.

Township trustees, three for each township, elected by people, control township road funds. They may appoint road superintendents. One trustee is elected each year at general election.

Kansas

The State engineer is appointed by the State Agricultural College, Manhattan.

W. S. Gearhart, Manhattan, State engineer; A. R. Losh, Assistant State Engineer.

Board of three county commissioners elected in November of odd years, has jurisdiction over State and county roads.

County engineer appointed by commissioner in June of odd years, has general charge under direction of county commissioners.

Township trustee, clerk and treasurer constitute township highway board having charge of township roads and mail routes.

One or more overseers shall be appointed by township board for each mail route and township road.

Kentucky

State road commissioner, Robert C. Terrell, Frankfort.

County fiscal court, consisting of county judge and five to eight justices of the peace, elected by people, have jurisdiction over all roads. County judges elected for four years, next election 1913.

A county road engineer is appointed by said court.

A district road overseer is appointed for each road district.

Louisiana

The board of State engineers of Louisiana, of which the highway department is a branch, is composed of the following members; F. M. Kerr, chief state engineer, Gervais Lombard, J. W. Monget, Marshall Robertson, John Klorer.

The officers of the highway department of the board of State engineers, are: F. M. Kerr, chief State engineer, and president of the board of state engineers; W. E. Atkinson, State highway engineer; C. C. Sandoz, secretary.

Police juries have control of roads in each parish. Last election April, 1912, for four years.

Maine

P. L. Hardison, State commissioner of highways; L. D. Barrows, assistant commissioner of highways; S. Frank Pierce, clerk.

Board of three selectmen in each town elected in March each year has control of roads.

Maryland

State Roads Commission, Baltimore.—Governor is ex officio chairman; O. E. Weller, Ira Remsen, William Bullock Clark, E. E. Goslin, W. B. Miller, Andrew Ramsay, Henry G. Shirley, chief engineer; W. L. Marcy, secretary.

Boards of county commissioners have full authority over local roads and may appoint supervisors, engineers, etc.

Massachusetts

State Highway Commission, Boston.—William D. Sohier, chairman; Frank D. Kemp, James W. Synan, Frank L. Bieler, secretary; Arthur W. Dean, chief engineer.

County commissioner may, upon petition lay out new roads or make specific improvements, and may direct towns and cities to make such improvements.

Selectmen, three to each town, elected in March each year, have purchasing power, except in cities.

A road superintendent or highway surveyor is usually elected at each annual town meeting. In some towns he is appointed by the selectmen.

Michigan

Townsend A. Ely, State highway commissioner, Lansing; Frank F. Rogers, deputy highway commissioner.

In counties having township system, one township commissioner, elected annually, has control.

In counties having district system control vests in a board of district supervisors, one from each township in the district, elected for a term of two years.

In counties having county system the Board of three County Commissioners is in charge. One commissioner is elected every two years, to hold office six years. All elections held the first Monday in April.

Minnesota

State Highway Commission, St. Paul.—C. M. Babcock, chairman; F. S. Bell, Clarence I. McNair.

George W. Cooley, State engineer and secretary of commission; John H. Mullen, chief road deputy; Carl E. Nagle, chief bridge deputy; S. C. Notestan, chief clerk.

Board of five county commissioners elected in November for four year term has control. Next election 1915. Three town supervisors in each town conduct work under county commissioners.

Mississippi

Each county must be divided into five districts, each of which elects a supervisor, the five constituting a county board of supervisors, who have full authority over roads. They are elected for a term of four years and take office in January. The next change occurs in 1916. The board of supervisors appoint three road commissioners to manage the roads of the county for a term of four years, subject to supervisors control.

Missouri

Highway Department of State Board of Agriculture, Columbia.—Curtis Hill, State highway engineer; William C. Davidson, assistant State highway engineer.

Missouri has two systems of local road administration. In ninety-two counties the county court, consisting of a chairman, elected for a term of four years, and two associates, elected for two years has control, and appoints a county engineer annually except in counties which have suspended the act relating to county engineers; divides the county into districts and appoints overseers who report to county engineer.

In the twenty-two township counties the roads in each township are under the control of a township board of three members, elected every two years, who divide the township into road districts and appoint overseers.

Next election for chairman county court, November, 1914. Two associate members county court elected November of even years. County engineers appointed in January of even years.

Montana

A. W. Mahon, Helena, State engineer.

County commissioners, three to each county, have supervision of roads. One commissioner is elected in November of even years and holds office for six years. The commissioners appoint supervisors and a county surveyor.

Nebraska

Donald D. Price, State engineer, Lincoln; H. W. Roberts, assistant State engineer, Lincoln.

County commissioners three to each county, elected in November of even years, have control where township organization does not exist. They divide county into districts, in each of which an overseer is elected by the people.

The county commissioners appoint a county highway commissioner in January of each year, who must be experienced road builder.

In counties under township organization, the county commissioners divide the county into seven supervisor districts, in each of which a supervisor is elected by the people. The town boards in each town have supervision over the roads, subject to the general control of the board of supervisors or the county commissioners. The town board divides the town into road districts and appoints an overseer for each district.

Nevada

W. M. Kearney, State engineer, Carson City; Perry Davis, superintendent of construction.

County commissioners elected by the people have supervision over the roads. They appoint a county surveyor and divide the county into road districts, in each of which they appoint a road overseer.

New Hampshire

State Highway Department, Concord.—S. Percy Hooker, State superintendent of highways.

Assistant Engineers.—F. W. Brown, Concord; F. E. Everett, Elkins; W. A. Grover, Dover; E. O. Hathaway, Nashua; H. L. Smith, Lakeport; C. M. Brooks, Keene; O. M. James, Northwood Narrows; C. H. Chandler, Concord; C. P. Riford, Concord.

New Jersey

State Department of Public Roads, Trenton.—Edwin A. Stevens, State road commissioner; Robert A. Meeker, State road supervisor.

The State department of public roads consists of the governor, the speaker of the house of representatives, the president of the senate and a commissioner of public roads, appointed by the governor. The State road supervisor is appointed by the commissioner and is in effect a chief engineer.

County boards of chosen freeholders, one member form each township, elected in January each year, have charge of roads. They appoint a county engineer in January for three year term. They also at the same time and for the same term appoint a county supervisor for construction work.

New Mexico

State Highway Commission, Santa Fe.—Wm. C. McDonald, governor; Robert P. Ervien, land commissioner; James A. French, State engineer. State road engineer, John D. Meriwether.

The county commissioners are elected in November at the regular election day and the next election will be in 1916 and will be for a term of four years. On account of adopting a new constitution and becoming a State, the present commissioners were elected in November, 1911, and will hold for five years. The commissioners take office the first of January following election.

The county road work is under the supervision of a county road board, who are appointed by the State highway commission for term of three years and subject to removal by them for cause. This law went into effect on September 10, 1912. The various boards were not appointed until November. They have all the authority relating to roads formerly delegated to the county commissioners, except that of taxation.

New York

State Commission of Highways, Albany.—C. Gordon Reel, superintendent of highways; John A. Bensel, State engineer and surveyor; Duncan W. Peck, superintendent of public works.

Charles P. Dillon, secretary of highway commission; Howard F. Carpenter, assistant secretary of highway commission; Charles F. Foley, first deputy superintendent; Edwin E. Dorn, second deputy superintendent; Harry P. Willis, chief engineer; Spencer J. Stewart, Poughkeepsie; Paul McLoud, Albany; James H. Studevant, Watertown; Frederick S. Strong, Syracuse; James S. Morrissey, Rochester; Perry Filkin, Binghamton, division engineers. The resident engineers are: John R. Kaley, Poughkeepsie; R. J. Marcher, Syracuse; Howard Smith, Syracuse; George T. Smith, Rochester; J. E. Kelly, Rochester.

Town highways are under town superintendents elected in November of even years. The superintendents are under supervision of a county superintendent.

North Carolina

Geological and Economic Survey, Chapel Hill.—Joseph Hyde Pratt, State geologist and engineer. Highway engineers: T. F. Hickerson, Ira Mullis, W. S. Fallis, R. T. Brown.

In most cases the county commissioners, averaging three in a county, and elected in November of even years, have control of roads. It is, however, becoming increasingly prevalent to have special road commissioners either as county or township commissions to take charge of road work.

North Dakota

T. R. Atkinson, State engineer, Bismark; Jay W. Bliss, assistant State engineer, Bismark.

County commissioners, of whom there are three in some counties and five in others, elected by the people, may appoint a county superintendent of highways in January of even years. The county superintendent has charge of the construction and maintenance of roads, and appoints deputies.

County Superintendents.—Griggs County, Martin A. Ueland, Cooperstown; Dickey County, Sol Hunter, Oakes; Stark County, W. R. Veigel, Dickinson; Billings County, Thor G. Plomasen, Beach; Burleigh County, John Ecklund, Wilton.

Ohio

State Highway Department, Columbus.—James R. Marker, State highway commissioner; deputies: Clifford Shoemaker, construction; John R. Chamberlin, bridges; A. H. Hinkle, maintenance. Division engineers: D. W. Seitz, Harwood Lersch, J. R. Burkey, Nicholas Koehler, Paul K. Sherdler, Arch. W. Smith, H. D. Bruning, J. H. Tilton, chief clerk.

County commissioners three to each county, elected in November of even years, have charge of county roads. County surveyor, elected at the same time, has direction of actual work.

Township trustees, three to a township, elected in November of odd years, have charge of township work.

Oklahoma

State Department of Highways, Oklahoma City.—Sidney Suggs, commissioner; Clark Hudson, assistant commissioner; W. R. Goit, chief engineer; Walter S. Gilbert, secretary.

Township board of trustees elected by the people has charge of roads in most of the counties. They appoint a road supervisor for each road district into which the township is divided.

County commissioners elected by the people may appoint a county engineer.

Several townships may be incorporated as a road improvement district for voting bonds and making improvements.

Oregon

John H. Lewis, State engineer, Salem; Percy A. Cupper, assistant State engineer.

County judges elected by the people have charge of roads.

Township supervisors elected every January have charge of work under direction of county judge.

Pennsylvania

State Highway Department, Harrisburg.—E. M. Bigelow, State highway commissioner; J. W. Hunter, first deputy commissioner; E. A. Jones, second deputy commissioner; S. D. Foster, chief engineer; L. F. Neffe, chief clerk.

Assistant Engineers: George H. Biles, Harrisburg; C. W. Hardt, Harrisburg; John T. Gephart, John Clearfield, W. F. Cressman, Philadelphia; A. W. Burk, Pittsburgh; A. S. Clay, Bloomsburg; H. W. Claybaugh, Franklin; G. C. Langenheim, Allentown; E. S. Frey, York; S. W. Jackson, Wellsboro; W. A. Wynn, Warren; O. K. Taylor, Jr., Washington; C. S. Lemon, Hollidaysburg; John I. Riegel, Scranton.

County commissioners, three to each county, elected for three year terms have charge of county work. Township supervisors, three to each township, have charge of township work. One member is elected in February each year.

Rhode Island

The State board of public roads at providence is made up as follows: John H. Edwards, Robert B. Treat, Frederick E. Perkins, William C. Peckham and John F. Richmond, members of board; Robt. F. Rodman, engineer; Peter J. Lannon, clerk.

The governor appoints one member of the board from each county for a term of five years, one vacancy occurring every year.

Each town through its officials, known as road commissioners or surveyors, looks after its road affairs. These officials are in some cases elected, in others appointed, by town council.

South Carolina

County commissioners elected in November of even years have charge of roads. In most of the counties a county supervisor of roads is elected at the same time. In other counties the commissioners appoint a county engineer.

E. J. Watson, commissioner of agriculture, commerce and industries, Columbia.

South Dakota

Samuel H. Lea, State engineer, Pierre.

The State engineer's department is at present looking after general road conditions in the State although not actually required by law to do so.

In some of the counties the roads are under supervision of county commissioners, of whom there are five, elected by the people. In other counties township boards of three supervisors have charge of roads within the township.

Tennessee

State Geological Survey, Dr. A. H. Purdue, State geologist, Nashville.

Judges of county courts have supervision of roads. In January of odd years the county court divides the county into road districts and appoints a road commissioner for each district. A board of turnpike commissioners, selected every four years by county court and consisting of three members, looks after toll roads. The district road commissioner appoints an overseer for each section of road in January each year. Many counties have special laws.

County judges have control of roads, and preside over commissioners. Court of four members besides the judge. The members are elected in November of even years for three-year terms. Districts or precincts may be formed in counties in which case trustees elected at same election have charge.

Utah

State highway commission consists of the governor, the State engineer, the State treasurer, and one member of the faculty of the Agricultural College and of the University of Utah.

Personnel.—William Spry, chairman; R. R. Lyman, J. W. Jenson, Jesse D. Jewkes, Caleb Tanner, secretary, W. D. Beers, State road engineer, Salt Lake City.

County commissioners, of whom there are three in each county, elected in November of even years, have supervision of roads. They appoint a county road commissioner who has full charge of the road work.

Vermont

State highway commissioner, Charles W. Gates, Franklin.

The State highway commissioner appoints a supervisor of roads in each county as his representative.

In March each year one selectman, of which there are three, and a road commissioner are elected in each town, the former to have charge of purchases and location and changes in roads, and the latter to have charge of maintenance.

Virginia

State Highway Commission, Richmond.—P. St. J. Wilson, State highway commissioner; William M. Thornton, dean, engineering department, University of Virginia; Colonel T. A. Jones, professor of civil engineering, Virginia Military Institute; R. H. Houston, dean engineering department, Virginia Polytechnic Institute; G. P. Coleman, assistant commissioner, B. Atkins, clerk.

Engineers: H. M. Darden, assistant; D. McDonald, assistant; C. B. Scott, assistant; W. F. Cocke, assistant; O. L. Grover, bridge; C. D. Snead, assistant to bridge.

County boards of supervisors, consisting of three members elected in January to serve four years have control of roads. The next election will be held in 1916. The board may appoint a county road superintendent in January of even years. They may also appoint a superintendent for each magisterial district. There are many special road laws relating to specific counties.

Washington

State Highway Board, Olympia.—Governor Ernest Lister, chairman; W. J. Roberts, State highway commissioner, secretary; Edward Meath, State treasurer; C. W. Clausen, State auditor, and George A. Lee of the public service commission.

Three county commissioners, elected in November of even years, two every two years and one every four years, the long term alternating, have control of roads, except where township system prevails. They divide county into districts and appoint a supervisor for each to serve at their discretion.

A county engineer is elected in November of even years.

The citizens of any county may by majority vote adopt township organization.

West Virginia

Three county commissioners, elected for six years, one every two years in November of odd years, have control of roads. The county commissioners may appoint a county engineer in September of odd years.

Wisconsin

Wisconsin Highway Commission, Madison.—J. A. Hazelwood, chairman, Jefferson; W. O. Hotchkiss, State geologist, Madison (ex-officio); F. E. Turneaure, Madison (ex-officio); John S. Owen, Eau Claire; J. H. Van Doren, Birnamwood.

A. R. Hirst, State highway engineer; M. W. Torkelson, bridge engineer.

A county commissioner elected in November for three years has charge of county road work. Where State aid is obtained he must appoint a county highway commissioner to act under the State highway commission.

A town chairman of town board, elected in April each year, has charge of town roads.

Wyoming

A. J. Parshall, Cheyenne, State engineer; Henry G. Watson, deputy engineer, H. A. True, Jr., Asst. Engineer.

Three county commissioners, elected in November of even years, one for two years, one for four years and one for two years respectively, have charge of roads. They may divide the county into road districts, in each of which a supervisor is elected. In most counties the whole county forms one district in which there is one supervisor.

State Geologists

Alabama Geological Survey, Dr. Eugene A. Smith, State geologist, University, Alabama.

Arkansas Geological Survey, N. F. Drake, State geologist, Fayetteville, Arkansas.

California State Mining Bureau, Fletcher M. Hamilton, State mineralogist, San Francisco, California.

Colorado Geological Survey, R. D. George, Boulder, Colorado.

Connecticut Geological and Natural History Survey, Prof. W. N. Rice, Superintendent, Middletown, Connecticut.

Florida Geological Survey, E. H. Sellards, State geologist, Tallahassee, Florida.

Geological Survey of Georgia, Dr. S. W. McCallie, State geologist, Atlanta, Georgia.

Illnois State Geological Survey, F. W. De Wolf, director, Urbana, Illinois.

Indiana Department of Geology and Natural History, Edward Barrett, State geologist, Indianapolis, Indiana.

Iowa Geological Survey, Prof. Geo. F. Kay, State geologist, Iowa City, Iowa.

Kansas State Geological Survey, Prof. Erasmus Haworth, State geologist, University of Kansas, Lawrence, Kansas.

Kentucky Geological Survey, J. B. Holing, State geologist, Frankfort, Kentucky.

Maine State Survey Commission, C. Vey Holman, State geologist, Brunswick, Maine.

Maryland Geological Survey, Dr. Wm. B. Clark, State geologist, Johns Hopkins University, Baltimore, Maryland.

Michigan Geological Survey, Mr. R. C. Allen, State geologist, 503 Hollister Block, Lansing, Michigan.

Minnesota Geological and Natural History Survey, W. H. Emmons, director, Minneapolis, Minnesota.

Mississippi Geological Survey, E. N. Lowe, State geologist, Jackson, Mississippi.

Missouri Bureau of Geology and Mines, Dr. H. A. Buehler, director, Rolla, Missouri.

Nebraska Geological Survey, E. H. Barbour, State geologist, University of Nebraska, Lincoln, Nebraska.

New Jersey Geological Survey, Dr. H. B. Kummel, State geologist, Trenton, New Jersey.

New York State Education Department, Science Division, Dr. John M. Clarke, director and State geologist, State Museum, Albany.

North Carolina Geological and Economic Survey, Dr. Joseph Hyde Pratt, State geologist, Chapel Hill, North Carolina.

North Dakota Geological Survey, A. G. Leonard, State geologist, Grand Forks, North Dakota.

Ohio Geological Survey, J. A. Bownokner, State geologist, Columbus, Ohio.

Oklahoma Geological Survey, D. W. Ohern, Norman, Oklahoma.

Oregon State Bureau of Mines, Prof. H. M. Parks, director, Corvallis, Oregon.

Pennsylvania Geological Survey, R. R. Hice, State geologist, Beaver, Pennsylvania.

Rhode Island National Resources Survey, C. W. Brown, State superintendent, Providence, Rhode Island.

South Dakota Department of Geology, University of South Dakota, E. C. Perisho, State geologist, Vermilion, South Dakota.

Tennessee Geological Survey, Dr. A. H. Purdue, State geologist, Capitol Annex, Nashville, Tennessee.

Texas Bureau of Economics, Geology and Technology, Dr. Wm. B. Phillips, director, Austin, Texas.

Vermont Geological Survey, Geo. H. Perkins, State geologist, Burlington, Vermont.

Virginia Geological Survey, Dr. Thos. L. Watson, State geologist, Charlottesville, Virginia.

Washington Geological Survey, Prof. Henry Landes, State geologist, Seattle, Washington.

West Virginia Geological Survey, Dr. I. C. White, State geologist, Morgan town, West Virginia.

Wisconsin State Geological and Natural History Survey, E. A. Birge, director, Madison, Wisconsin.

Wyoming Geological Survey, C. E. Jamison, State geologist, Cheyenne, Wyoming.

HIGHWAY ENGINEERING EDUCATION

Agricultural and Mechanical College of Texas, College Station, Texas

The course is given by the civil engineering department and consists of two lecture periods per week, of one hour each, during one semester of the junior year. This course covers general elementary study of the subject of country roads and city pavements; character of materials and types of construction in different parts of the State and United States; the location and drainage of roads; road maintenance; road laws of Texas and other States; road finances; organization and supervision. The text is supplemented by lectures, the use of bulletins, road machinery, models and samples of materials. The textbook heretofore used was *Roads and Pavements*, Baker.—Robert J. Potts, Dean.

Alabama Polytechnic Institute, Auburn, Alabama

Roads and Pavements.—Five hours a week for fifteen weeks is devoted to class room instruction in economic principles involved in road improvement—analysis of resistance to traction—location, grades, and drainage of new roads; relocation and improvement of existing roads; construction and maintenance of earth, gravel and macadam roads; bituminous materials in road construction; street plans of cities and towns; width and grade of streets; curbs and gutters; construction of and comparative merit of various kinds of street pavements; construction of sidewalks; street drainage.—John J. Wilmore, Dean.

Armour Institute of Technology, Chicago, Illinois

The course is given in the first semester of the senior year, covering a period of eighteen weeks, three hours per week. The study includes economic theory of the location and construction of country roads; design, construction, and maintenance of city streets and pavements, and a study of the various materials for road building and for streets and pavements.

Byrnes' *Highway Construction* is used as a text, supplemented by lectures, library references and inspection trips to paving work on Chicago streets.—H. M. Raymond, Dean.

Brown University, Providence, Rhode Island

The course aims to teach economics and theory of location and construction of country highways. Emphasis is placed on the relative advantages of the different forms of modern surfaces for country highways; and the adaptability of the different forms of surfaces for city work. Methods of testing various road materials are taught by lecture.

Field trips are required for the purpose of inspecting the many forms of pavements existing about Providence. Inasmuch as the whole of the work is taught in three hours per week during the second semester of the junior year, instruction is general, emphasizing vital points rather than detail.—John E. Hill, Professor of Civil Engineering.

Bucknell University, Lewisburg, Pennsylvania

The economic location, design and construction of roads and pavements are considered, comparisons being made between the various methods and materials. Sections of roads and streets are surveyed and from the notes taken plans, specifications and estimates for construction and paving are prepared. The instruction is given in the first term, junior civil engineering, five hours.—C. A. Lindemann.

Columbia University, New York City

The uniform graduate course in highway engineering, leading to the master's degree, comprises sixteen separate courses. The amount of work called for is equivalent to one academic year of twenty recitation periods per week. The course is given only during the months from December to March, inclusive, hence it is necessary for graduate students in highway engineering, candidates for the master's degree, to be in residence during two winter periods, the equivalent of one academic year.

The subjects, all of which are considered from an advanced standpoint, are as follows: economics and design of roads and pavements; macadam and other roads, brick, stone block, wood block and cement-concrete pavements; bituminous surfaces and bituminous pavements, highway jurisprudence, highway laws and systems of administration, highway bridges and culverts, management engineering, non-bituminous road materials, laboratory course, road surveying and design, street surveying and design, seminar courses in highway engineering literature, manufacture and testing of bituminous materials, testing bituminous materials, laboratory course, engineering geology, lithology and petrology.—Arthur H. Blanchard, Professor of Highway Engineering.

Delaware College, Newark, Delaware

In highway engineering the following is offered in the course of civil engineering: Two hours per week for the second semester, junior year, about one-half of the hours are devoted to study of textbook matter, while the rest of the time is used in making illustrative surveys, and in designing road surfaces and culverts. Several additional discussions of practical road problems are held. Special attention is given to road maintanance.—CLARENCE A. SHORT, Professor Mathematics and Engineering.

Harvard University, Cambridge, Massachusetts

This course consists of twenty-five lectures upon the construction and maintenance of roads and pavements. It is assumed that, in preparation, the student has adequate knowledge of curves, earth work computations, and such elementary principles of mechanics as are applicable to railroads and roads.

Howard University, Washington, D. C.

Roads and Pavements.—One hour per week, first half year. Study of good roads problems, traffic over country roads and city streets and best methods of construction and maintenance for earth, gravel and broken stone roads. Text: Baker's *Roads and Pavements.*—P. B. PERKINS, Director.

Iowa State College, Ames, Iowa

A very important part of the instruction in highway engineering is scattered through the civil engineering course. Special instruction in surveying and drafting for highway work is given in connection with the various courses in surveying and drafting. Special instruction in bridge and culvert work for highway purposes is given in connection with the various courses in structural engineering and plain and reinforced concrete. Special instruction in the testing of road materials is given in connection with the courses in civil engineering laboratories.

A special course in roads and pavements, with two hours' credit, is given in the senior year, the class generally containing about fifty students.

The State College of Iowa constitutes by law the Iowa State highway commission, and a large number of students are employed by the hour, while college is in session, or full time throughout vacation, and for full time while staying out of college a year or more, on actual highway and bridge construction with the commission.—A. MARSTON, Dean and Director.

Lafayette College, Easton, Pennsylvania

Roads and Pavements.—Location, construction and maintenance of town and country roads, city streets and pavements, street cleaning, second term, junior year. Two periods per week. This term is eleven weeks long and each period is one hour long, therefore the total time in the classroom devoted to the subject is twenty-two hours.

Road Material Laboratory.—Each student makes standard rattler test of paving brick and also the test on road metal by the Deval machine. We expect to install this winter a new laboratory for the test of petroleums, malthas, tars and asphalts. The equipment will be that recommended in Bulletin No. 38 of the Office of Public Roads. These laboratory tests are made in the second term of the junior year.—WILLIAM T. LYLE, Professor of Municipal Engineering.

Maryland Agricultural College, College Park, Maryland

Four periods a week for one term are given to the theory of highway engineering. Such part of eight periods as is necessary is given to practice in the field. This involves reconnaissance, preliminary, location and relocation surveys and includes setting of grade stakes, computation of quantities, etc.

Attention is given in certain other courses to matters pertaining to highway engineering. The subject of highway bridges and culverts is treated in structural design and lectures and laboratory practice on cement and concrete are given during one term.—T. H. TALIAFERRO.

Massachusetts Institute of Technology, Boston, Massachusetts

Highway Engineering.—Course consists of fifteen lectures during second term of third year. It comprises an outline of the principles governing location, construction, and maintenance of roads, and construction and maintenance of the various kinds of pavements for city streets. The textbook is Baker's work on *Roads and Pavements.*

Roadway Construction.—Two hours of lectures or conferences per week accompanied by extensive assigned reading, inspection of road construction, examinations of reports and cost records.

Road Bitumens and Binders.—A course of fifteen lectures and thirty hours in the laboratory in the second term. This course deals with applications and tests of bitumens, tars, oils, paints and chemicals used in preservation of roads and road structures.

Surveying and Plotting.—A course of fifteen two-hour exercises per term throughout the second year consisting of lectures and recitations supplemented by exercises in field and drafting-room.

Field work is confined to use of chain, compass, transit and level. Work in drafting-room consists in making computations, scale drawings, profiles and contour maps and studying their application to the solution of engineering problems. Textbook is *The Principles and Practice of Surveying* by Professors Breed and Hosmer, Volume 1.

Plane Surveying.—This course given at the summer camp consists of field-work supplemented by lectures and work in drafting-room. Field work consists in making surveys with compass and chain and with the transit and tape, running of profiles and cross-sectioning with level, use of solar attachment to transit, and in astronomical determination of a meridian. Work in drafting-room consists in making computations which arise in surveying operations and in making scale drawings, profiles and contour maps from field-notes. Textbook is *The Principles and Practice of Surveying* by Professors Breed and Hosmer, Volume 1.

Topographic Surveying.—This course given at the summer camp consists of lectures, field-work and work in drafting-room.

Field-work consists in making plane and topographic surveys with stadia transit, making of large and small scale maps with plane table, use of sextant in hydrographic surveys, use of traverse plane table in making road traverses for small scale maps, use of barometer for determining differences in elevation, and in determination of azimuth angles by solar observations.

Textbook is *The Principles and Practice of Surveying* by Professors Breed and Hosmer, Volume 2.

Advanced Surveying.—This course of thirty hours in first term of third year is devoted to construction of stadia diagrams, completion of computations and map work taken during summer, and in making of topographic maps from surveys made with camera.

Michigan Agricultural College, East Lansing, Michigan

Pavements.—Two lecture hours per week. Winter term of twelve weeks. Described as a study of the methods and materials used in improving suburban roads and city streets. Required of seniors in civil engineering.

Road Construction.—Two recitation hours. Six hours field-work per week. Spring term of ten weeks. Described as the principles and practice of highway location, construction and maintenance. Required of seniors in the forestry course.—G. W. BISSELL, Dean.

New York University, New York City

A course embodying the general principles of highway construction. It includes a study of preliminary and location surveys, foundations, paving materials, consideration of the suitability of various types of roads, dust prevention, street cleaning and maintenance, and side-walk construction. Sophomore, first term. Lectures or recitations, two hours. Textbook *Highway Engineering*, by Morrison.—CHAS. H. SNOW, Dean.

North Dakota Agricultural College, Fargo, North Dakota

Roads and Pavements.—Advantages, methods of construction and maintenance, and cost of highway improvements are discussed. City pavements are studied in more detail. Durability, desirability, grades, cross-sections and cleaning of pavements, as well as methods of assessment are considered. Textbook, Baker's *Roads and Pavements*. Prerequisites, trigonometry and surveying. Spring term, four hours. This work is given in junior year of the civil engineering course and in senior year of the agricultural engineering course.—R. H. SLOCUM.

The Ohio State University, Columbus, Ohio

Highway engineering is given in junior year under the general title of civil engineering on roads and streets. The course runs eighteen weeks and is given three hours of lecture and recitation work per week. The textbook employed is Baker's. In addition to the text assignments students are required to make from thirty to fifty readings of selected articles on highway work from the engineering publications and magazines. The instructor takes the classes out for several short trips to inspect the streets of Columbus and vicinity.—EDWARD ORTON, Dean.

Oregon Agricultural College, Corvallis, Oregon

Roads and Pavements.—A thorough study of the fundamental principles of location, construction and maintenance of roads as well as of materials used in road and street construction. Asphalt, brick, wood block, stone, concrete and other forms of street pavements are carefully studied and their actual worth as road material is studied by carefully arranged tests that are made in well equipped laboratories. These tests parallel textbook work and include the mechanical analysis of sands and aggregates; determination of voids and a study of mixtures; abrasion, hardness, toughness, recementing and other tests made on macadam rock; tests on paving brick; the standard tests on bituminous compounds. The textbook and lecture course is a three credit course for one semester and the experimental work is one credit for a semester.

The above is required of all civil engineering students and is elective for other engineering students.

Highway Engineering.—Economic grades and proper location for different soils and surfacing materials; surface and sub-surface drainage; culvert design and construction; construction and maintenance of earth, sand-clay, oiled earth, gravel and macadam roads; dust preventives and road binders; preliminary surveys and estimates; specifications; elective three credits for one semester.

Highway Improvement.—A condensed course in highway construction and maintenance. Special attention is given to the care of earth roads. The course is especially arranged to meet the needs of these interested in roads in country districts. Three credits for one semester.

Economics of Highway Construction.—Economic and social advantages of improved roads; the traffic census; local and centralized systems of control; highway laws; organization of construction and engineering forces; cost data; methods of handling work; forms of contract, etc. Three credits for one semester—GORDON V. SKELTON, Professor of Engineering.

The Pennsylvania State College, State College, Pennsylvania

Highway engineering is taught in a full four year undergraduate course, essentially a course in civil engineering, but modified by changes in the latter part so that more time is made available for strictly highway engineering branches. The specialized work in highway engineering, beginning at the middle of the junior year and continuing to the end of the senior year, is as follows: two hours of recitations and lectures per week for one semester in theory of roads and pavements, four hours per week for one semester in laboratory testing of bituminous road materials; and about six hours per week through one year are devoted to the necessary surveys, drawings and computations for the design and estimate of cost for the improvement and reconstruction of a section of a street or road. For experimental and practical study of road building the School of Engineering has available a 12-ton Monarch steam roller, a road grader, a stone crusher and screens. There are also several log drags, road hones, plows, etc. The laboratory equipment consists of a 4-cylinder Deval abrasion machine, a Dorrey type abrasion machine, a Page impact testing machine for testing toughness of rock, a Page ball mill, briquette machine and a Page impact machine for testing cementation value of rock, a diamond core drill, a diamond saw and a 9-inch grinding lap. The laboratory for testing bituminous materials is fully equipped with the usual pycnometers, glass retorts, beakers, flasks, etc., and a Cleveland oil tester, Engler viscosimeter, Dow penetration machine and numerous pieces of minor apparatus necessary to carry on all the usual tests on bituminous materials.

In conjunction with the forestry department a creosoting plant is available for treating wood for wood pavements. Experiments are conducted in the uses of dust preventives, the student doing the actual work of sprinkling and treating the road surface.—JOHN P. JACKSON, Dean.

Polytechnic Institute of Brooklyn, Brooklyn, New York

The instruction in highway engineering is given during one semester of fifteen weeks, two periods per week. The course consists essentially of oral and blackboard class-room recitations on textbook matter, practically all of Baker's *Roads and Pavements* being covered. Problems are assigned for solution out of class-hours. Inspection trips are made for the purpose of examining the various types of pavements and for studying methods of construction. Reports embodying the information gathered on these trips are submitted. Students are also required to read extracts from current literature on the subject. Monthly written quizzes are held and a final examination covering the entire subject is given at the end of the term.—C. W. HUDSON, Professor of Civil Engineering.

Purdue University, Lafayette, Indiana

Under municipal engineering a six weeks course is offered in highway engineering. It consists of six lectures and eighteen hours of field and drafting work. In addition, the course in testing materials includes the testing of road materials, such as broken stone, gravel, cement, concrete and paving brick, by standard methods.—W. N. MOTT, Professor of Engineering.

Rensselar Polytechnic Institute, Troy, New York

Baker's *Roads and Pavements* is covered by recitations and lectures. Field and laboratory work are given. Class-room work includes instruction in the following subjects: economics of roads and pavements; design of grades and of sub-division of a property into streets and lots; surveys for roads and pavements; design and construction of drains, bridges, culverts, race tracks, equestrian roads, curbs and sidewalks; design, specifications for and construction of macadam, telford, bituminous macadam, asphalt, brick, stone block and wooden block pavements.

The discussion of bridges and surveys for roads and pavements is given outside of the recitations above mentioned. The lectures are given by practicing engineers on subjects connected with roads and pavements. In the field work the practice covers the methods of laying out streets and lots, grading and giving lines and grades for curbs and pavement surfaces.

In the laboratory the work is as follows. Cement laboratory, complete tests of cements and mortars using the specifications and methods recommended by the American Society of Civil Engineers and the American Society for Testing Materials. Determination of strength and deformation of concrete cubes, cylinders and reinforced beams using various mixtures, materials and types of reinforcement. Determination of voids in sand and stone and demonstration of relation between density of concrete and its strength. Sieve analyses of sand. Determination of percentages of loam and vegetable matter in sand. Paving brick tests, abrasion, absorption and transverse tests of paving block, using the rattler adopted by the National Paving Brick Manufacturers Association in 1911. Macadam tests, abrasion tests in the Deval abrasion cylinders using the specifications of the American Society for Testing Materials. Toughness tests, using the machine recommended by the above Society. Hardness tests, using the Dory hardness machine as adopted by the U. S. Office of Public Roads.

Bituminous Road Materials.—The equipment and methods are the same as those of the Office of Public Roads as described in Bulletin 38.

Rhode Island State College, Kingston, Rhode Island

The course in highway engineering covers four hours per week for one-half year, three being recitations and lectures and one two-hour period per week for field and laboratory work. The textbook is by Howard Frost. Our field work consists in making a location survey for a piece of road, making a profile, calculating the quantities of cut and fill and cost of construction.

The subject of bridges is studied separately, six hours per week Culverts and arches are studied under the head of masonry.—S. H. Webster, Professor of Engineering.

Rose Polytechnic Institute, Terre Haute, Indiana

The course on roads and pavements is given to the civil engineering students for one hour a week during the second term of the junior year. The work consists of lectures and recitations with a small amount of laboratory work on the inspection and identification of road materials. We have been using Baker's *Roads and Pavements* for a textbook, supplemented by the pamphlets of numerous manufacturers of paving materials.—C. Leo Mees, President.

Rutgers College, New Brunswick, New Jersey

In our course of highway engineering, we devote nine weeks, four periods per week, to the subject in the classroom. The subject is taught both by lecture and textbook. Supplementing the classroom work are problems and exercises in the drafting-room, visits to localities where road construction is in progress, distribution of government and other pamphlets on the subject, and lectures by engineers in actual service. Laboratory work in materials and construction is carried on in connection with that of other subjects. The design of the course is to acquaint the student with these general principles that govern the proper designing and construction of roads and pavements, without specializing in particular methods or materials of construction.—ALFRED A. TITSWORTH, Professor of Civil Engineering.

Sheffield Scientific School of Yale University, New Haven, Connecticut

Undergraduate Course.—A course in roads and pavements is given in fall term of senior year to all members of civil and sanitary engineering courses. The total amount of time allowed is thirty hours. Instruction is by means of textbook supplemented by assigned articles in current engineering publications. About one-half of each exercise of one hour is devoted to recitation on the subject matter of the text, and the remainder to reports on assigned articles by different members of the class. A brief description of the pavements in New Haven is furnished to each student, who is required to inspect several different kinds of pavements and to render a brief written report. Groups of three students, working in relays, make traffic observations during one twelve-hour period. Observation blanks are furnished by the city engineer of New Haven. No laboratory work is given. Two written exercises of tests are held at intervals during the term, and a final written examination is required.

Graduate Course.—A course in railroad and highway engineering, to which six hours per week for nine weeks are devoted, is offered to first year graduate students in civil and sanitary engineering. Instruction is given by means of lectures which deal largely with economic location. Practice is offered by assigning a problem in location to each group of two or three students. Whether the problem shall involve the location of a highway or of a railway is left optional with the student. About two-thirds of the time allowed for the course is spent in the field and drawing room; and a final report including rough map, grade, estimated quantities and cost is required of each student.—C. F. FARNHAM.

State College of Washington, Pullman, Washington

There are two courses in highway engineering. One is an introductory course having a value of three hours. This included a study of the location, construction and maintenance of country roads, city streets and pavements. The effect of alignment, grades, drainage and cross-contour are studied. Particular attention is given to the most approved methods of constructing road and street surfaces with the various materials, while little or no attention is given to the physical or chemical properties of the materials. The course is given one semester of four and one-half months.

The second course, called advanced highway engineering, has a value of five hours. This included a study of the properties of road stone and road binders, and making the test of these materials as recommended by the Office of Public Roads at Washington, D. C. (the departnent has a complete set of testing machines and laboratory equipment for making these tests) the origin and source of materials, the preparation of the materials for paving, and the effect of traffic and climate on the lasting qualities of the materials. Each class is required to make a model road to the scale of 1½-inch to the foot from some given material. The course is given one semester consisting of two recitations and three three-hour laboratory periods. Text, Byrnes' *Highway Construction*, Richardson's *Asphalt Pavements*, etc. A student taking the highway option will have the following schedule during his junior and senior years:

Junior Year.—First Semester: hydraulics, five hours; railroads, five hours; theoretical mechanics, five hours; least squares, two hours; highways, three hours. Second Semester: Advanced railroads, five hours; applied mechanics, four hours; mechanics, laboratory, one hour; advanced highway engineering, five hours; electrical engineering, five hours.

Senior Year.—First Semester: roofs and bridges, five hours; contracts, two hours; reinforced concrete, two hours; foundations, three hours; history, five hours; construction method, three hours. Second Semester: framed structures, five hours; field astronomy, five hours; elective, five hours; thesis, five hours.—O. L. WALLER, Professor of Engineering.

State University of Kentucky, Lexington, Kentucky

In order to encourage young men to study rural and highway engineering two free scholarships are granted by each county in the State. These scholarships are awarded by the fiscal courts of the respective counties. Appointments to this course are made prior to the first day of September of each year and are good only for rural and highway engineering.

Highway Location: Principles and methods followed in locating highways. Location of several miles of road, five hours per week, first term. Highway Construction: Methods of construction, materials to be used and how to use them. Determining the size and kind of culverts, bridges and other openings on roadways. Methods of determining the final quantities, five hours per week, third term. Highway Maintenance· A study of the best methods to be followed in maintaining and keeping highways and bridges in good repair. Lectures, assigned readings and reports. Inspection of roads in the vicinity of the University, three hours per week, second term.—PROFESSORS ROWE and TERRELL.

Syracuse University, Syracuse, New York

First semester, eighteen periods, fourth year. A lecture course covering the theory and modern practice of construction of standard types of roads and pavements. Pamphlets, dealing with the various phases of good roads, are furnished to the students and these are discussed together with assigned references in current engineering magazines.—LOUIS MITCHELL.

Thayer School of Civil Engineering, Hanover, New Hampshire

A brief technical course is given on the theory and practice of highway construction, using for this purpose Baker's *Roads and Pavements*. The time devoted to it is less than thirty half-days. and instruction is given merely by consecutive recitations from the textbook. Our work in surveying covers all the necessary features of highway surveying in another connection entirely apart from this textbook course. We have no laboratories for testing materials for road construction, except the usual testing machine and a laboratory for general purposes.—ROBERT FLETCHER, Director.

The State Agricultural College of Colorado, Fort Collins, Colorado

The work which refers especially to highway construction occupies one semester and is a five-hour course. During this time the location and construction of highways under varying conditions and the fundamental principles of paving of all kinds are covered. Testing materials, surveying, and the operation of the different machines for road construction are taken up in the regular scheduled civil engineering course.—E. B. HOUSE, Professor of Engineering.

The Tulane University of Louisiana, New Orleans, Louisiana

Through the department of civil engineering a three-hour course during the second term of the senior year is given in roads, streets and pavements; in addition about three hours each term are devoted to instruction in the design of bridges in timber and reinforced concrete. This is in addition to the regular course in bridge design. Two weeks are spent each year in road surveys in the northern part of the State. It is the object of the department to teach its students how best to use the materials that may be most easily obtained in the neighborhood.—DONALD DERICKSON.

Throop Polytechnic Institute, Pasadena, California

Highway Engineering.—Design, construction, and repair of country and city roads and pavements; methods of grading; comparison of different types of construction for different kinds of traffic; contracts and specifications for construction. Required of civil engineering students first semester, junior year.—GEORGE ALFRED DAMON, Dean of Engineering.

University of Alabama, Tuscaloosa, Alabama

A four-year course leading to the degree of bachelor of science in highway engineering is given. The course is quite similar to the regular course in civil engineering, some special courses in road economics and work in the road material laboratory being substituted for subjects of less importance to highway engineers. The road materials laboratory, in connection with the physical and cement testing laboratories, the geological department of the University, and the State Geological Survey collections and equipment, is intended to afford facilities for the study of the road materials of Alabama and to furnish students with a research laboratory as well as instructions in the physical properties and usefulness of the various kinds of road materials.—GEORGE J. DAVIS, JR., Dean.

University of California, Berkeley, California

The course in highway engineering is given in two lecture periods per week during the first semester of each academic year. The course is elective. Outside reading assignments cover the text of Baker's *Roads and Pavements*. Lectures constitute about three-quarters of the course; oral recitations and written examinations the remainder. The principles and approved types of highways are emphasized. Earth, gravel and broken stone roads; brick, wood block, stone block, sheet asphalt and asphalt macadam pavements. The testing laboratory has the following equipment for tests of road materials; macadam 4-cylinder Deval machine; briquette molding machine; Page impact machine for cementation and toughness; Diamond core drill and Diamond saw for preparing specimens, brick, standard rattler adopted by the National Paving Brick Manufacturers' Association, all apparatus for making transverse and compression tests, asphalt penetrometer, Dulin Rotarex, a complete set of sieves and all necessary apparatus for chemical determinations.—C. DERLETH, JR., Dean.

University of Florida, Gainesville, Florida

In the senior year a course in municipal engineering, including the subjects of highway engineering, water supply and disposal of wastes. The course lasts for one-half year, and occupies five hours per week of lectures or recitations, plus two hours per week devoted to practical exercises in the field, office or laboratory, or on inspection trips. Approximately one-third of this time is given to highway engineering. The course is required of students of civil engineering.—J. R. Benton, Dean.

University of Idaho, Moscow, Idaho

In the civil engineering course a two-credit course for one semester in given on road and pavements, requiring two class periods per week of recitation, lecture, drawing or field work. Instruction necessary for a highway engineer is given in connection with many other courses, such as surveying, drafting, testing laboratory and structural engineering. In addition to this work, the Department, with the assistance of the U. S. Office of Public Roads, carried out a program of a short school for road overseers. —C. N. Little, Dean.

University of Illinois, Urbana, Illinois

The special instruction in highway engineering at present consists of two recitations per week for eighteen weeks in the third year. In this work Baker's *Roads and Pavements* is used as a textbook. Arrangements are nearly complete for offering in addition four recitations per week for eighteen weeks. All students in civil engineering in addition to the above special instruction governing highways, have the usual college work in surveying, bridges, masonry construction, contracts, etc.—W. F. M. Goss, Dean.

The State University of Iowa, Iowa City, Iowa

The course in highways and highway engineering given is as follows: Location, construction and maintenance of country highways and city streets and walks, cleaning of city streets, and methods of assessing costs of construction. The course consists of three recitations for nine weeks. Bridges and culverts are covered in course of structures.—Wm. G. Raymond, Dean.

University of Kansas, Lawrence, Kansas

The course of highway engineering is a half-year's work in roads and pavements in the junior year, in addition some little work is done in a small laboratory for testing road materials.—R. B. H. Begg, Professor of Engineering.

University of Maine, Orono, Maine

Highway Engineering.—This course as now offered in the fall term to the junior civil engineering students consists of two one-hour periods per week for eighteen weeks. The textbook used is Baker's *Roads and Pavements* which is supplemented by references in engineering journals, government publications, State highway reports, the latest trade literature on road materials, exhibits of samples road section, oils, etc. The instruction covers the economics, location, drainage, construction and maintenance of country roads and city streets under different conditions of climate and traffic, and also the comparison of costs, advantages and disadvantages of the various kinds of roads and pavements. Attention is called and visits are made to the highway and street work near the University and in neighboring cities. A study is made of the traffic, climatic and municipal conditions of a designated street in Bangor, Maine, and each student is required to prepare a report thereon, presenting his findings, selecting the proper pavement for the street in question, and giving complete reasons for his choice. —H. S. BOARDMAN, Dean.

The University of Minnesota, Minneapolis, Minnesota

A course is given in roads and pavements in the second semester of the junior year. During the first half of the semester, work consists of recitations and lectures on road location and construction. Many problems and reference readings on actual practice of construction are assigned. In the second half of the semester inspection of work in progress on the roads tributary to the Twin Cities and of pavements being laid is made. Both the asphalt and timber creasoting plants of Minneapolis are visited by the students. In the new Experimental Building space has been assigned for tests on road material and some apparatus is already in place. The general course in civil engineering includes surveying, methods of computing earthwork, masonry and steel structures, hydraulics, geology, economics of transportation, etc.—FRANCIS C. SHENEHOY, Dean.

University of Missouri, Columbia, Missouri

The course of highway engineering is as follows: Roads and pavements, an elementary course given by recitations from textbook supplemented by lectures, two periods per week for one semester. Required by all students in civil engineering. Highway engineering, a more advanced course, conducted mainly as seminar work, references given to sources of information, and reports being required of the students on various assigned topics with discussion before the class. A part of the time is used in textbook study of bituminous roads. Two periods per week for one semester. Elective to students who have had the first course. Testing road materials, a laboratory course covering the ordinary tests of rock for road purposes, and for bitumens. One period a week for one semester. Elective. Highway structures, a design course, comprising design of culverts and small bridges, mainly in concrete, including a reinforced concrete arch. Two periods a week for one semester. Elective for seniors.—H. B. SHAW, Dean.

The University of Nebraska, Lincoln, Nebraska

Roads and Pavements.—A course of readings, lectures and recitations covering a study of the location, alignment, drainage construction and maintenance of earth, sand-clay, gravel, macadam, telford, concrete and bituminous roads. Also the planning and drainage of city streets and the construction and maintenance of brick, asphalt, wood-block and other forms of pavements. Modern methods of dust prevention are studied under maintenance,

Testing Road Materials.—Lectures and laboratory. This is a study of the occurrence, properties and characteristics of various kinds of road making materials; the laboratory being equipped for the following tests: strength—compressive, tensile and transverse, hardness, toughness, cementing and recementing or binding-power, abrasion, specific gravity and absorption. And the bituminous materials: penetration, ductility, volatilization, specific gravity, float test for viscosity and consistency, determination of melting point, determination of bitumen soluble in various solvents, determination of aggregate in bituminous mixtures. Rattler and other tests for brick, etc.

Cement and Concrete Testing.—Lectures and laboratory. Classification, composition, manufacture, inspection and sampling of cements. Specifications for mixing and using. Practical testing of cement mortars and concretes. The laboratory is equipped for making all the standard tests as proposed by the American Society of Civil Engineers, the American Society for Testing Materials and the United States Board of Engineers; for tests of concrete, plain and reinforced; tests of clay and concrete tiling, etc.

Some of the other courses that should be taken by one specializing in road engineering are, in addition to the regular preliminary course required of all engineering students, surveying, railway surveying and construction, economic theory of railway location, hydraulics, materials of construction, mechanics of materials, masonry construction, cleaning and sewerage of cities, technical or industrial chemistry, engineering geology. Some work in steam and gas engines and power transmission.—GEO. R. CHATBURNE, Professor of Engineering.

University of Notre Dame, Notre Dame, Indiana

The course on highway engineering is given in the senior year to the civil engineering students, and is studied four hours a week for sixteen weeks. The class-room work includes recitations and lectures, and comprises a study of the drainage of highways, methods of location, most desirable and economical location, a study of grades, and the materials used in road construction, road covering, city streets and paving materials, the paving materials examined as to wearing, strength and other properties, and most approved method of maintenance. Instruction is given as to plans and specifications, and the advantages of improved highways to communities strongly emphasized. Students do field work and prepare plans, profile and specifications of a proposed highway after making the necessary survey and leveling, thus teaching the practical application of the principle taught in the class-room. Visits of inspection are made when possible and the methods seen discussed and analyzed.—M. J. McCue, Dean.

University of Pennsylvania, Philadelphia, Pennsylvania

Two hours a week for the first half of the senior year are devoted to the subject of roads and pavements. The instruction on this subject is based on a textbook, supplemented by lectures. For purpose of recitations the class is divided into sections and occasionally written tests are held. No special test in the testing of road materials is offered, but three hours a week for half of the senior year are devoted to tests of cement and concrete and three hours a week for one-half of the junior year to the testing of the materials of construction in general, including stone, wood, paving brick, etc.—Edgar Marburg, Professor-in-Charge.

University of Pittsburgh, Pittsburgh, Pennsylvania

Roads and Pavements.—A study of the location, width and transverse section of roads and streets, together with a study of the materials used and methods of constructing, repairing and improving the surfaces of roads and pavements. Two recitations of one hour each from an assigned text and colateral reading with three hours laboratory work per week for the last term (twelve weeks) of the senior year; required of all civil engineering students. The laboratory work included determination tests of the various properties of road materials, the efficiency of binders and dust preventives.—F. L. Bishop, Dean.

University of South Carolina, Columbia, South Carolina

Roads and Pavements.—Lectures and recitations on the principles of road location; the construction and maintenance of earth, gravel, sand-clay and macadam roads; pavements for city streets and sidewalks. The class is given practical problems in road location and construction, and whenever practicable is taken out to assist in actual road surveys and computations, and the estimates for improvement thereon; they also view actual road construction and make reports thereon. First term, three hours per week.

Dust Preventives.—This course comprises five lectures, the study of standard authors, field observations and a writtem report covering the range of the subject. Reading matter will be assigned to the students at the end of their second year, and the five lectures will occur during the first term of the third year. A written report must be in before the first of May of the third year.—M. G. Homes, Professor of Engineering.

University of Utah, Salt Lake City, Utah

The course given in roads and pavements covers two hours' recitation work per week and Baker's *Roads and Pavements* is used as a basis for the course. Reports are required of students from the current engineering magazines and the reports of the engineering societies.—R. B. Ketchum, Professor of Engineering.

University of Vermont, Burlington, Vermont

The instruction in highway engineering comprises a three-hour course given in the second half of the senior year. It covers textbook and lecture work accompanied by laboratory work in testing of road materials, and field work in road surveys, the laying out of work, plans, estimates and specifications.—J. W. Volty, Dean.

University of Wisconsin, Madison, Wisconsin

There are two courses in road and pavements. The first is an elementary course in location, specifications and construction of highways and city streets. A good textbook is used as a basis of instruction, but library work, reports and theme writing are also required. This course is given the first semester, and meets two hours per week. An advanced course in roads and pavements is also offered the second semester, meeting two hours a week. In this course special study is made of the most important problems concerning the construction and maintenance of roads and pavements. Pavement inspection trips to various cities are required. A start has been made toward the installation of a laboratory for testing paving materials, and special instruction will be given in this work.—Ray S. Owen, Professor of Engineering.

University of Wyoming, Laramie, Wyoming

Roads and Tunnels.—(a) Road economics and location, gravel, broken stone, and miscellaneous roads; street pavements, drainage, curbs and gutters, pavement foundations, asphalt, brick, cobblestone and stone-block pavements; sidewalks. One hour. (b) Methods of surveying, tunnel machinery, timbering and lining, tunnels through hard rock and soft ground, submarine tunneling, ventilation and lighting, cost of construction. One hour.

Worcester Polytechnic Institute, Worcester, Massachusetts

The course in highway engineering given students in civil engineering consists of reading, recitations and lectures for one-half year, one period per week. All students taking the course have had thorough courses in surveying, railroad surveying and construction, masonry and foundations and later take courses on bridges, sewers and drains. Much of the important subject matter on road construction is taken in these subjects, but not formally as a course in highway construction.—A. W. French, Director.

Virginia Polytechnic Institute, Blacksburg, Virginia

Roads and Building Material.—A special set of lectures, with illustrations, is given upon the general and detailed construction of roads, city and country, pavements and drains, cost, grades, repair, etc. The points emphasized in these lectures are: Different road coverings and the best materials available for use and economy, the inspection and testing of sands, cements and mortars, their actual mixing, proper proportions, etc., with specifications and requirements for good building materials, tests and demonstrations of the peculiarities of the different road materials, with short course in concrete. Textbook, Byrne's *Highway Construction*. Three times a week second term. In connection with this course is given a short course in curves, earth-work and calculating cuts and fills. Lectures on available instruments for use in building highways and comparative costs.—Paul B. Barringer, President.

Washington University, St. Louis, Missouri

Roads, Streets and Pavements.—The location, drainage, construction and maintenance of streets and roads; consideration of the different paving materials in connection with their particular characteristics and their adaptability and adequacy under various conditions of service; the cost and life of pavements. Two lectures a week. First semester. Senior year.—J. L. Van Ornum, Professor of Engineering.

West Virginia University, Morgantown, West Virginia

The following courses in highway engineering are regularly given in the department of railway and highway engineering: Roads and pavements, primarily for fourth year students in civil engineering, three hours. Required of all candidates for degree in civil engineering. Location, construction and maintenance; study and comparison of various types of roads; road making materials; lectures, recitations and field work. Highway economics two hours. Optional for fourth year students in civil engineering. Continuation of roads and pavements with special reference to permanent improvements and maintenance of existing roads. Re-surveys, re-location, drainage, etc.

The course in roads and pavements is required of all candidates for degrees of civil engineering, but for the course of highway economics the student may substitute the equivalent in hydraulic construction if he so elects. These courses follow thorough courses in surveying, railroad location, railroad construction and maintenance and accompany courses in sanitary and water supply engineering, in which the problems relating to sewerage and drainage are considered, so that the courses in highway engineering are concentrated on the special problems to be met in the building of roads not common to other subjects. During this year a complete line of machines and apparatus for testing road materials will be installed.—C. R. Jones, Dean.

TREATISES ON ROAD, BRIDGE, AND CULVERT CONSTRUCTION AND ALLIED SUBJECTS[1]

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[1] Only modern works in English, which are easily obtainable, have been given in this list. Articles in periodicals, which are both numerous and valuable, and publications of the various State organizations and federal departments have been excluded. The publications of the Office of Public Roads, U. S. Department of Agriculture, are given in a separate list.

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BULLETINS, CIRCULARS AND DOCUMENTS

Publications of the Office of Public Roads, U. S. Department of Agriculture[1]

ANNUAL REPORTS

Report of the special agent and engineer for road inquiry for 1893. Roy Stone.
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BULLETINS

1. State laws relating to the managment of roads, enacted in 1888–1893. Compiled by Roy Stone.
2. Proceedings of the Minnesota Good Roads Convention, held at St. Paul, Minn., January 25 and 26, 1894.

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[1] The department supply of a number of these publications is exhausted, but copies may be had by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 5 cents each except in the case of bulletins, which range from 5 to 30 cents. A revised list of publications of the Office of Public Roads is issued every three months, and copies can be had upon request to that office.

3. Improvement of the road system of Georgia. O. H. Sheffield.
4. Report on road-making materials in Arkansas. J. C. Branner.
5. Information regarding road materials and transportation rates in certain States west of the Mississippi River.
6. Information regarding roads, road materials, and freight rates in certain States north of the Ohio River.
7. Information regarding roads and road-making materials in certain eastern and southern States.
8. Earth roads: hints on their construction and repair. Roy Stone.
9. State aid to road building in New Jersey. Edward Burrough.
10. Proceedings of the National Road Conference, held at Westminster Church, Asbury Park, N. J., July 5 and 6, 1894.
11. Proceedings of the Virginia Good Roads Convention, held in Richmond, Va., October 18, 1894.
12. Wide Tires. Laws of certain States relating to their use, and other pertinent information. Compiled by Roy Stone.
13. Kentucky highways: history of the old and new systems. M. H. Crump.
14. Good roads: extracts from messages of governors. Compiled by Roy Stone.
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20. Traction tests. S. T. Neely.
21. Proceedings of the International Goods Roads Congress, held at Buffalo, N. Y., September 16 to 21, 1901.
22. Proceedings of the Third Annual Good Roads Convention of the Board of Supervisors of the State of New York, held at Albany, N. Y., January 28 and 29, 1902.
23. Road conventions in the southern States, and object-lesson roads constructed under the supervision of the Office of Public Road Inquiries, with the coöperation of the Southern Railway.
24. Proceedings of the North Carolina Goods Roads Convention, held at Raleigh, February 12 and 13, 1902. Compiled by J. A. Holmes.
25. Proceedings of the Jefferson Memorial and Interstate Good Roads Convention, held at Charlottesville, Va., April 2, 3, and 4, 1902.
26. Proceedings of the National Good Roads Convention, held at St. Louis, Mo., April 27 to 29, 1903.
27. The construction of sand-clay and burnt-clay roads. W. L. Spoon.
28. The decomposition of the feldspars. A. S. Cushman and Prevost Hubbard.
29. The Construction of Macadam Roads. A. B. Fletcher.
30. The Corrosion of Iron. A. S. Cushman.
31. Examination and classification of rocks for roadbuilding, including the physical properties of rocks with reference to their mineral composition and structure. E. C. E. Lord.
32. Public-road mileage, revenues, and expenditures in the United States in 1904. M. O. Eldridge.

33. Road materials of southern and eastern Maine. Prepared in coöperation between the United States Geological Survey, the State Survey Commission of Maine, and the Office of Public Roads. Henry Leighton and E. S. Bastin.
34. Dust preventives. Prevost Hubbard.
35. The preservation of iron and steel. A. S. Cushman.
36. Descriptive catalogue of the road model exhibit of the Office of Public Roads, Alaska-Yukon-Pacific Exposition. Prepared by the Office of Public Roads.
37. Examination and classification of rocks for road building, including the physical properties of rocks with reference to their mineral composition and structure. Edwin C. E. Lord.
38. Methods for the examination of bituminous road materials. Prevost Hubbard and Charles S. Reeve.
39. Highway bridges and culverts. Charles H. Hoyt and William H. Burr.
40. The road material resources of Minnesota. George W. Cooley.
41. Mileage and cost of public roads in the United States in 1909. J. E. Pennybacker, Jr. and Maurice O. Eldridge.
42. New Hampshire highways. Report of an inspection of highways in the State of New Hampshire, August, 1911. Charles H. Hoyt.
43. Highway bridges and culverts. Charles H. Hoyt and William H. Burr.
44. The physical testing of rock for road building, including the methods used and the results obtained. June, 1912. Albert T. Goldbeck and Frank H. Jackson.
45. Oil-mixed portland cement concrete. August, 1912. L. W. Page.

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14. Addresses on road improvement. Roy Stone.
15. An act to provide for the construction of roads by local assessment, county, and State aid, passed by the New York Assembly.
16. Highway Taxation: Comparative results of labor and money systems.
17. Origin and work of the Darlington Road League. Roy Stone.
18. Report of committee on legislation Adopted by the State Good Roads Convention, held in Richmond, Va., October 10 and 11, 1895.
19. Traffic of the country roads.
20. Comments on systems of maintaining country roads.
21. Methods of constructing macadamized roads. Extract from a report prepared by the chief engineering inspector of the Local Government Board. (England.)
22. Appeal for organization of State and local road-improvement societies. C. A. Locke.
23. Money value of good roads to farmers. W. C. Latta.
24. Highway maintenance and repairs. Revision of Circulars 16, 20, and 24.
25. Brick paving for country roads.
26. Going in debt for good roads.
27. Cost of hauling farm products to market or to shipping points in European countries.
28. Addresses on road improvement in Maine, New York, North Carolina, and Illinois. Roy Stone.
29. The forces which operate to destroy roads, with notes on road stones and problems therewith connected. C. L. Whittle.
30. Repairs on macadam roads. E. G. Harrison.
31. Must the farmer pay for good roads? Otto Dorner.
32. State aid to road building in Minnesota. A. B. Choate.

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34. The social, commercial, and economic phases of the road subject. W. H. Moore.
35. Road improvement in New York.
36. List of national, State, and local road associations and kindred organizations in the United States.
37. The railroads and the wagon roads. A. L. Craig.
38. A study of rock decomposition under the action of water. A. S. Cushman.
39 to 46 inclusive. Public roads of Washington, Arizona, Arkansas, Oregon, Iowa, Virginia, North Carolina, and Alabama: Mileage and expenditures in 1904. M. O. Eldridge.
47. Tar and oil for road improvement: Report of progress of experiments at Jackson, Tenn.
48 to 87 inclusive. Public roads of Tennessee, New Hampshire, Maryland Maine, New Mexico, Pennsylvania, Montana, Wyoming, North Dakota, South Dakota, Kentucky, Florida, South Carolina, Nebraska, Nevada, Kansas, Idaho, Colorado, Indiana, Oklahoma, Utah, California, Illinois New Jersey, Missouri, Louisiana, New York, Ohio, Georgia, Mississippi, West Virginia, Wisconsin, Minnesota, Delaware, Michigan, Rhode Island, Massachusetts, Texas, Connecticut, and Vermont: Mileage and expenditures in 1904. M. O. Eldridge.
88. Publications of the Office of Public Roads. Revised June, 1909. Compiled by A. E. Draper. (Out of date.)
89. Progress reports of experiments with dust preventives.
90. Progress reports of experiments in dust prevention, road preservation and road construction.
91. Sand-clay and earth roads in the Middle West. W. L. Spoon.
92. Progress reports of experiments in dust prevention and road preservation.
93. Bitumens and their essential constituents for road construction and maintenance. Prevost Hubbard.
94. Progress reports of experiments in dust prevention and road preservation, 1910. Prepared by the Office of Public Roads.
95. Special road problems in the southern States. D. H. Winslow.
96. Naphthalene in road tars. I. The effect of naphthalene upon the consistency of refined tars. Prevost Hubbard and Clifton N. Draper.
97. Coke-oven tars of the United States. Prevost Hubbard.
98. Progress reports of experiments in dust prevention and road preservation, 1911. December, 1912.

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136. Earth roads. M. O. Eldridge.
235. Cement mortar and concrete: preparation and use for farm purposes. P. L. Wormeley.
239. The corrosin of fence wire. A. S. Cushman.
311. Sand-clay and burnt-clay roads. W. L. Spoon.
321. The use of the split-log drag on earth roads. D. W. King.
338. Macadam roads. A. B. Fletcher.
403. The construction of concrete fence posts. Prepared by the Office of Public roads.
461. The use of concrete on the farm. Prepared by the Office of Public Roads.
505. Benefits of improved roads. September, 1912.

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24. Best roads for farms and farming districts. Roy Stone.
25. State highways in Massachusetts. G. A. Perkins.
26. Improvement of public roads in North Carolina. J. A. Holmes.

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40. Coöperative road construction. Roy Stone.

Yearbook of the Department of Agriculture, 1897

118. Object-lesson Roads. Roy Stone.

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149. Steel-track wagon roads. Martin Dodge.
150. Construction of good country roads. M. O. Eldridge.

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172. Progress of road building in the United States. M. O. Eldridge.

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204. The selection of materials for macadam roads. L. W. Page.
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240. Road building with convict labor in the southern States. J. A. Holmes.
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305. Progress of road building in the Middle West. R. W. Richardson.
332. Building Sand-clay roads in southern States. W. L. Spoon.

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350. Practical road building in Madison County, Tennessee. S. C. Lancaster.

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407. Progress of road legislation and road improvement in the different States. Prepared in the Office of Public Roads.

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412. Object-lesson roads. L. W. Page.

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513. Information in regard to fabricated wire fences and hints to purchasers. Allerton S. Cushman.

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85. The cementing power of road materials. L. W. Page and A. S. Cushman.
92. The effect of water on rock powders. A. S. Cushman.

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  Bulletin 2. Roads and road materials of Alabama. W. F. Prouty.
  Bulletin 3. First annual report of the State highway commission, 1912.

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State Convention of Supervisors, San José, 1896.
  Road sprinkling. Paper read before State Convention of County Supervisors at San José, by M. Manson. 1896.

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    Bulletin 3. Physical features of the State.
    Bulletin 4. The effect of roads on industrial development.
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- Bulletin 8. A preliminary report on roads and road building materials of Georgia (1901). S. W. McCallie.
- Bulletin 24. A second report on the public roads of Georgia (1910). S. W. McCallie. (First report, Bulletin 8.)
- Bulletin 28. A third report on the public roads of Georgia (1912). S. W. McCallie.

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- Bulletin 2. Road drag law and rules for dragging.
- Bulletin 3. How to secure bridge plans. Information for county, township, and municipal officers (out of print).
- Bulletin 4. Crushed stone prepared by convict labor and rules for its use (out of print).
- Bulletin 5. General rules and regulations (out of print).
- Bulletin 6. Modern bridges for Illinois highways (out of print).
- Bulletin 7. Township hard road law (out of print).
- Bulletin 8. Manual of Instructions to engineers.

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- 30th Annual Report, 1905. Roads and road materials of Indiana. W. S. Blatchley and Assistant.

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- Manual for Iowa highway officers, 1905–06.
- Bulletin, vol. 3, no. 1. Road and bridge improvement in Iowa, 1908.

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  Annual report, 1837. Directions for construction of turnpike roads.
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  Review of history of internal improvement of the past. A large number of reports and bulletins were issued by the State Board of Internal Improvement and the Legislature regarding toll roads.
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  Biennial report, 1881–83. Statement showing number of turnpikes in which State owns stock, length of each in miles, whole number of shares of stock, number owned by State, amount per share, average per cent stock has paid for six years prior to January 1, 1882; amount of dividends paid State, cost for salaries to gate keepers and officers, and cost of repairs. 1882–1885.
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  Annual report, eighth, part 2, 1889. Conditions of public highways in Kentucky, 1889.
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  Biennial report, twelth, 1895–97, Estimated number of miles of macadamized turnpikes in State; end of twelve months will probably see last of old toll system and inauguration of new system of maintenance by taxation, 1897.
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  Second, 1907. Dirt roads, their construction and maintenance.
  Third, 1908. County roads.
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  Fifth, 1910. Road legislation in Kentucky. McCracken County Judge.
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  Bulletin 3. Duties of selectmen and road commissioners.

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  Annual report, 1893. In House documents 1894.
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  Annual report, 1896. Laboratory experiments on road building stones.
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  Annual report, 1899. Instructions of highway commission to engineers; approved March 30, 1899. Road materials and their physical properties.
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  Volume 3, nos. 1, 3 and 4.
  Volume 4, nos. 1 and 2.
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  Bulletin 3. The county road system. F. G. Randall. 1911.
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  Bulletin 2. Rules and regulations of State highway department of Minnesota.
  Bulletin 3.
  Bulletin 4. Better roads for Minnesota. Address by Hon. Logan Waller Page.
  Bulletin 5. Additional rules and regulations for the construction and improvement of State roads.
  Bulletin 6. Report of the State highway engineer on highway systems of foreign countries.
  Bulletin 7. Additional rules and regulations for the construction of State roads and bridges.
  Bulletin 8. Specifications.
  Bulletin 9. Specifications.
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  Circular 3. Partial digest of the laws pertaining to the highway commission and expenditures of the State aid funds.

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Quite a list of publications is reported by the State highway engineer, covering all that have been issued in the State, but, as most of the publications are out of print, only those which are available are listed.

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Bureau of Geology and Mines
  Public roads (February, 1907).
Missouri University, Agricultural Experiment Station
  Bulletin 52. Influence of height of wheel on draft of wagon (October, 1901).
Missouri University, Engineering Experiment Station
  Monthly Bulletin. An investigation of the road making properties of Missouri stone and gravel (September, 1911).

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  Bulletin 77. Road construction in New Hampshire.
State Legislature. House
  Journal, 1893. Report of committee on roads, bridges, and canals accompanying joint resolution for appropriation for highways.
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  Annual report, 1894–96. Proceedings of first good roads convention.
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Agricultural Experiment Station
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  Bulletin 1. Practical suggestions and directions to highway officials relating to construction and improvement, repair and maintenance of town highways and bridges. F. D. Lyon.
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  Annual report, 1899. Engineer's suggestions regarding employment of prison labor to improve public highways of State.
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  Annual reports, 1902, 03. Proceedings of third and fourth annual good roads convention of board of supervisors of New York State held at Albany.
  Annual reports, 1902, 03. Compilation of laws for improvement of public highways.
  Annual reports, 1904, 1905, 1906, 1907, 1908.
  Bulletin 1. Improvement of public highways (1899).
  Bulletin 2. Improvement of public highways (1899).
  Bulletin 3. Improvement of public highways. Instructions for obtaining State aid in the improvement of public highways (1901).
  Bulletin 4. Issued by U. S. Department of Agriculture as Public Roads Inquiries Bulletin 22.
  Bulletin 5. Proceedings of fourth annual supervisors' highway convention of State of New York (1903).
  Bulletin 6. Proceedings of fifth annual supervisors' highway convention of State of New York (1904).
  Bulletin 7. Improvement, repair and maintenance of public highways (1904).
  Bulletin 8. Comparison of progress during period in which the State aid law has been in operation in New York State (1905).
  Bulletin 9. Proceedings of the sixth annual good roads convention of the board of supervisors of the State of New York (1905).
  Bulletin 10. Road Red Book (1905).
  Bulletin 11. Comparison of progress during the period in which the State aid law has been in operation in New York State (1906).
  Bulletin 12. Road Red Book (1906).
  Bulletins 13, 14, 15. Comparisons of progress during operation of State aid law (1907, 1908).

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State Senate
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Document 74 (1850), vol. 2. Report of secretary of State regarding number and length of plank roads of State.

North Carolina

State Geological and Economic Survey
Bulletin 4. Road materials and road construction of North Carolina (1893). J. A. Holmes and W. Cain.
Economic Papers. 2. Some recent road legislation in North Carolina.
5. Highway commission Bulletin 1. Recent road legislation in North Carolina.
27. Highway work in North Carolina, 1911.
28. Culverts and small bridges for country roads (1912).
30. Proceedings of North Carolina Good Roads Association.
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Biennial Report, 1909, 1910.

North Dakota

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Bulletin 2. Construction of country roads. Sam Houston.
Bulletin 3. Maintenance of country roads. Sam Houston.
Bulletin 4. State supervision and State aid. Sam Houston.
Bulletin 5. Convict labor for road improvement. Sam Houston.
Bulletin 6. Condition and cost of country roads in Ohio.
Bulletin 7. Revised instructions and forms. Sam Houston.
Bulletin 8. Road laws of Ohio (exhausted).
Bulletin 9. Proposed amended State aid law. Sam Houston.
Bulletin 10. Road laws of Ohio.
Bulletin 11. Highway maps of the counties of Ohio (exhausted).

State Highway Department—Continued

Bulletin 12. Report of experiments to determine the comparative values of various road-binding materials.

Bulletin 13. Supplemental report on Nelson Avenue experimental road.

Bulletin 14. An act creating the State highway department and providing aid in construction and maintenance of highways.

Bulletin 15. Supplemental reports on experimental road work.

Bulletin 16. Effect of wagon roads.

Bulletin 17. Earth roads.

State Board of Public Works

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Bulletin 21. Road making and repairing. 1896.

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Bulletin 2. Preliminary report on rock asphalt, asphaltic petroleum, and natural gas in Oklahoma. 1911.

Bulletin 7. Preliminary report on the clays and clay industries of Oklahoma. 1911.

Bulletin 8. Preliminary report on the road materials and road conditions of Oklahoma. L. C. Snider. 1911.

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Oregon

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Biennial Reports. 1905–06 to 1911–12.

State Agricultural College. Department of Geology and Mining Engineering.

Bulletin 1. Road materials in the Williamette Valley. H. M. Parks. 1911.

Bulletin 2. Highway improvement—earth roads and culverts. E. F. Ayers.

State University

Bulletin, vol. 2, no. 2. Tendencies in recent American road legislation. F. G. Young.

Bulletin, vol. 9, no. 5. The economics of the Oregon good roads problem, 1912. F. G. Young.

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State Highway Department

Annual reports from 1904.

Bulletin 1. Supervisors and their duties.

State Department of Agriculture

Bulletin 15. Good roads for Pennsylvania, 1896.

Bulletin 66. Pennsylvania road statistics by townships. John Hamilton.

Bulletin 69. The road making materials of Pennsylvania. M. C. Ihlsing.

Bulletin 121. Address of Hon. J. W. Hunter, State highway commissioner.

Rhode Island

State Commissioner of Highways

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State Board of Public Roads
  Annual reports from 1902.
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  Annual Report, 1899. Advantages of State aid to farmers. W. W. Armstrong.
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  Report of the joint committee to examine into the condition of roads and public highways of the State, 1895.

South Carolina

State Superintendent of Public Works
  Report, 1832.
State Agricultural Experiment Station. Clemson Agricultural College
  Bulletin 48. Broad and narrow tires.
Handbook of South Carolina issued by Department of Agriculture, Commerce and Immigration, 1907.
  Same, edition of 1908.
Reports of the Commissioner of Agriculture, Commerce and Industries for the years of 1909, 1910, 1911 and 1912.
  Same, Monograph, The economic value of good roads, 1910.
Bulletin. Good roads—How to build and maintain them. M. Goode Homes, C.E., University of South Carolina, January, 1912.

South Dakota

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  Reports, first to fourth; 1906 to 1911–12.
  Bulletin 3. Good roads, 1912.

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  Special message of Governor Malcolm R. Patterson to the 57th General Assembly, January, 1911.
State Agricultural Experiment Station
  Bulletin, vol. 3, no. 3, 1890. Road construction.

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  Bulletins, 1901 to 1904. Nine volumes. 1. Texas petroleum, 1901. 3. Coal, lignite and asphalt rocks, 1902.

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State Road Commission
  Biennial report, 1909–10 and 1911–12.
State University. State School of Mines
  Bulletin 2. Tests of macadam roads. E. H. Beckstrand.
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Vermont

State Highway Commissioner
  Reports, first to seventh; 1899–1900 to 1911–12.
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  Biennial Report, second, 1873–74. Highways. A. B. Halbert.
State Legislature—Senate
  Journal 1855. Report of committee on roads.

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State Agricultural Experiment Station
  Bulletin 34, 1893. Road improvement.
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State Board of Public Works
  Reports, 1816, 1818, 1819–20, 1823 to 1847, 1849 to 1855, 1866 to 1876.

Washington

State Highway Department
  Bulletin 1. State and county road laws by legislature of 1907.
  Bulletin 2. Report to Governor of Washington on convict labor on State roads.
  Bulletin 3. State aid roads.
  State investigating committee, highway department. Report of the board of control on State rock crushing plants; working convicts on State roads and at crushing plants.
  Biennial reports, 1906, 1908, 1910, 1912.
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  Bulletin 39, 1899. Road improvement.
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  Bulletin 2. The road materials of Washington.

West Virginia

State Highway Inspector
  Partial report, 1908.
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  Biennial Report, first, 1909–10.
  Circular, September, 1909. Construction and use of split-log drag.
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  Bulletin 1. Road drags, their construction and use. H. E. Williamson.
  Bulletin 2. To the county road engineers.
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  State road map, 1911.

Wisconsin

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  Bulletin 10 (Economic Series 6). Highway construction. 1903.
  Bulletin 18 (Economic Series 11). Rural highways of Wisconsin. W. O. Hotchkiss. 1906.
  Road Pamphlet 1. Earth roads. A. R. Hirst. 1907 and 1909.
  Road Pamphlet 2. Earth road drag. A. R. Hirst.
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State Agricultural Experiment Station
  Report for 1902. Road construction in Wisconsin.
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  Bulletin 79, 1899. Road construction and maintenance.
State Highway Commission
  Bulletin 1. The new State and highway law, chapter 337, Laws 1911.

Wyoming

State Engineer
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Preliminary report, January 14, 1913.
Other reports and hearings to be issued later.

American Highway Association

Good Roads Year Book of the United States, 1912 and 1913.
Addresses, Papers and Resolutions, American Road Congress, 1911.
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Road Periodicals

The American City. $2.00 per year. Monthly. Published by The Civic Press, 93 Nassau Street, New York City.

Annales des Ponts et Chaussees. 45 francs a year. Bi-monthly. Published by Ecole Nationale des Ponts et Chaussees, 28 Rue des Saints-Peres, Paris, France.

Better Roads. $1.00 per year. Monthly Published by U. B. Publishing House, Jesse Taylor, Editor, Dayton, Ohio.

The Bulletin. $1.00 per year. Monthly. Published by the General Contractors Association, 51 Chambers Street, New York City.

Canadian Engineer. $3.00 per year. Weekly. Published by Monetary Times Printing Company, Ltd., James J. Salmond, Managing Editor, Toronto, Canada.

Concrete-Cement Age. $1.50 per year. Monthly. Published by Concrete-Cement Age Publishing Company, 97 Fort Street West, Detroit, Michigan.

Cement Era. 50 cents per year, three years $1.00. Monthly. Published by Cement Era Publishing Company, 1207 Morton Building, Chicago, Illinois.

Cement and Engineering News. $2.00 per year. Monthly. Published by William Seafert, Editor, 22 Fifth Avenue, Chicago Illinois.

Cement World. $1.00 per year. Monthly. Published by Cement World Company, 241 Fifth Avenue, Chicago, Illinois.

Contractor. $1.00 per year. Semi-monthly. Published by E. H. Baumgartner, 842 Monadnock Block, Chicago, Illinois.

Engineering-Contracting. $2.00 per year. Weekly. Published by Myron C. Clark Publishing Company, 608 S. Dearborn Street, Chicago, Illinois.

Engineering News. $5.00 per year. Weekly. Published by Engineering News Publishing Company, 505 Pearl Street, New York City.

Engineering Record. $3.00 per year. Weekly. Published by McGraw Publishing Company, 239 West 39th Street, New York City.

Good Roads. $2.00 per year. Weekly. Published by E. L. Powers Company, 150 Nassau Street, New York City.

Kansas Good Roads Advocate. 50 cents per year. Monthly. Published by the Kansas State Good Roads Association.

Municipal Engineering Magazine. $2.00 per year. Monthly. Published by Municipal Engineering Company, Charles C. Brown, Editor, Indianapolis, Indiana.

Manufacturers Record. $4.00 per year. Weekly. Published by Manufacturers Record Publishing Company, Baltimore, Maryland.

Michigan Roads and Forests. $1.00 per year. Monthly. Published by the State Review Publishing Company, 70 Larned Street West, Detroit, Michigan.

Municipal Journal and Engineer. $3.00 per year. Weekly. Published by Municipal Journal and Engineer, Inc., 50 Union Square, New York City.

Pacific Builder and Engineer. $5.00 per year. Weekly. Published by Fuller Publishing Company, Pacific Building, Seattle, Washington.

Rock Products. $1.00 per year. Monthly. Published by The Francis Publishing Company, 537 South Dearborn Street, Chicago, Illinois.

Southern Good Roads. $1.00 per year. Monthly. Published by Southern Good Roads Publishing Company, Lexington, North Carolina.

The Road Maker. $1.00 per year. Monthly. Joe L. Long, Publisher, Des Moines, Iowa.

The Surveyor. 32 s. per year. Weekly. Published by St. Bride's Press, Ltd., 24 Bride Lane, Fleet-Street, London, E. C. ,England.

The Tradesman. $2.00 per year. Weekly. Published by The Tradesman Publishing Company, Chattanooga, Tennessee.

Zeitschrift fur Transportwesen und Strassenbau. 24 marks per year. Issued three times a month. Published by Julius Englemann, Berlin W. 35, Lutzowstr. 97, Germany.

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1,013,105. Oil-can. Madel T. Axelton and William C. Axelton, Grettinger, Iowa. Filed November 21, 1910. Serial No. 593,421. Patented January 2, 1912.

1,014,023. Road-machine. Frank B. Peck, Mount Vernon, Mo. Filed January 30, 1911. Serial No. 605,567. Patented January 9, 1912.

1,014,507. Sprinkling-machine. Raymond F. North, Glendive, Mont. Filed August 27, 1909. Serial No. 514, 957. Patented January 9, 1912.

1,014,989. Road-grader. Joseph D. Adams and Roy E. Adams, Indianapolis, Ind., assignors to J. D. Adams and Company. Indianapolis, Ind. Filed December 23, 1910. Serial No. 598,945. Patented January 16, 1912.

1,015,004. Road-grader attachment. Philip Chounard, Pembina, N. D. Filed May 5, 1911. Serial No. 625,271. Patented January 16, 1912.

1,015,465. Grader and ditcher. Lawson M. Williams, Henry, N. C., assignor of one-half to George N. Chapman, Bostic, N. C. Filed February 14, 1911. Serial No. 608,520. Patented January 23, 1912.

1,015,820. Road-leveling device. Nathaniel S. Monroe, Arthur, Ill. Filed March 24, 1911. Serial No. 616,715. Patented January 30. 1912.

1,016,228. Scraper and leveler. Rex H. O'Neill, Chicago, Ill. Filed August 12, 1908. Serial No 448,212. Patented January 30, 1912.

1,017,346. Expansion-joint for concrete roadways. Avila Thomas, Detroit, Mich., assignor to Thomas Steel Reinforcement Company, Detroit, Mich. Filed October 25, 1911. Serial No. 656,558. Patented February 13, 1912.

1,017,650. Wood paving-block. James A. Cogswell, Boston, Mass. Filed June 17, 1911. Serial No. 633,808. Patented February 20, 1912.

1,017,706. Paving-block. Edward A. Tracy, Boston, Mass. Filed June 17, 1911. Serial No. 633,697. Patented February 20, 1912.

1,018,040. Utilizing Sulfur-containing petroleum. John E. Eggleston, Bayonne, N. J., assignor to Standard Oil Company, Bayonne, N. J. Filed August 21, 1903. Serial No. 170,357. Patented February 20, 1912.

1,018,160. Excavator. James M. Brooks, Molena, Ga. Filed March 9, 1911. Serial No. 613,336. Patented February 20, 1912.

1,018,374. Utilizing sulfur-containing petroleum. Clarence I. Robinson, West New Brighton, N. Y., assignor to Standard Oil Company, Bayonne, N. J. Filed March 21, 1907. Serial No. 363,712. Patented February 20, 1912.

1,018,518. Scraper. Lee Pettit, Cleburne, Tex. Filed July 22, 1911. Serial No. 639,960. Patented February 27, 1912.

1,018,602. Excavator. Charles E. Bathrick, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed September 28, 1908. Serial No. 455,021. Patented February 27, 1912.

1,018,672. Dirt-loader. William R. Litzenberg, Portland, Ore. Filed March 17, 1911. Serial No. 615,135. Patented February 27, 1912.

1,018,785. Road-drag. Daniel Shank, Clayton, Ill. Filed January 19, 1911. Serial No. 603,556. Patented February 27, 1912.

1,018,804. Liquid-sprayer. Lewis A. Aspinwall, Jackson, Mich., assignor to Aspinwall Manufacturing Company, Jackson, Mich. Filed June 9, 1909. Serial No. 501,097. Patented February 27, 1912.

1,018,834. Rock-drill. Charles H. Locher, Glasgow, Va. Filed November 15, 1909. Serial No. 528,202. Renewed December 30, 1911. Serial No. 668,764. Patented February 27, 1912.

1,018,917. Navigable rock-cutter. Fred Lobnitz, Crookston, Scotland. Filed July 17, 1911. Serial No. 638,835. Patented February 27, 1912.

1,018,954. Wheeled scraper. John Baron, El Centro, Calif. Filed April 4, 1911. Serial No. 618,782. Patented February 27, 1912.

1,018,971. Method or process of purifying hydrocarbon liquids. Thomas S. Hamilton, Kansas City, Mo., assignor to the Purified Petroleum Products Company. Filed April 22, 1911. Serial No. 622,802. Patented February 27, 1912.

1,018,984. Combined loader and spreader. Austin J. Parcels, Wetmore, Kans. Filed January 22, 1910. Serial No. 539,487. Patented February 27, 1912.

1,019,126. Street-flushing machine. Jacob I. Brorby, Shenandoah, Iowa. Filed March 25, 1911. Serial No. 616,805. Patented March 5, 1912.

1,019,153. Road scraper and grader. Samuel E. Hughes, Alexandria, Ind. Filed March 14, 1911. Serial No. 614,405. Patented March 5, 1912.

1,019,165. Traction-wheel. Chester B. Lord, St. Louis, Mo. Filed February 27, 1911. Serial No. 611,140. Patented March 5, 1912.

1,019,206. Rock-core drill. William R. Wallace, Houghton, Mich. Filed March 31, 1911. Serial No. 618,227. Patented March 5, 1912.

1,019,213. Electromagnetic rock drill and chipping hammer. Clarence E. Adams, Lebanon, Ind. Filed May 14, 1908. Serial No. 432,921. Patented March 5, 1912.

1,019,417. Road-drag. William L. Bott and Otis M. Davis, Star City, Ind. Filed October 9, 1911. Serial No. 653,697. Patented March 5, 1912.

1,019,458. Suspension-bridge. William H. C. Greer, Sherman, Tex. Filed December 28, 1911. Serial No. 668,380. Patented March 5, 1912.

1,019,539, Cement-finishing machine. George W. Sharp, Enid, Okla. Filed January 28, 1910. Serial No. 540,514. Patented March 5, 1912.

1,019,655. Suspended bridge. Thomas Kalla, Oppeln, Germany. Filed April 24, 1911. Serial No. 623,123. Patented March 5, 1912.

1,019,997. Stone-crushing machine. Edgar B. Symons, Ft. Wayne, Ind., assignor by mesne assignments, to Smith and Post Company, Milwaukee, Wis. Filed February 26, 1904. Serial No. 195,459. Patented March 12, 1912.

1,020,002. Corrugated culvert. George W. Warner, Topeka, Kans. Filed November 23, 1911. Serial No. 662,044. Patented March 12, 1912.

1,020,325. Composition of matter. Conrad O. Stinebaugh, Seattle, Wash., assignor by direct and mesne assignments, to General Charcrete Company, Seattle, Wash. Filed July 11, 1911. Serial No. 638,032. Patented March 12, 1912.

1,020,380. Crusher and pulverizer. Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher and Pulverizer Company, St. Louis, Mo. Filed October 1, 1910. Serial No. 584,866. Patented March 12, 1912.

1,020,504. Excavating-machine. John Hood, Detroit, Mich., assignor of one-half to James Pitton, Detroit, Mich. Filed April 22, 1911. Serial No. 622,662. Patented March 19, 1912.

1,020,633. Self-contained machine for preparing road wearing-surfaces. Paul C. Brennan, New York, N. Y., assignor by mesne assignments, to the United States Asphalt Refining Company, New York, N. Y. Filed December 22, 1908. Serial No. 468,761. Patented March 19, 1912.

1,020,640. Road-binder-mixing machine. William F. Davis, Kansas City, Kans. Filed March 16, 1910. Serial No. 549,815. Patented March 19, 1912.

1,020,779. Culvert-pipe. Herbert S. Putney and Firman L. Carswell, Topeka, Kans. Filed July 17, 1911. Serial No. 638,933. Patented March 19, 1912.

1,020,911. Ditching-machine. William L. Combs and John A. Kerber, Belfry, Mont. Filed September 14, 1910. Serial No. 582,049. Patented March 19. 1912.

1,021,047. Grading-machine. Eugene C. Jewett, Eagle Grove, Iowa. Filed June 15, 1911. Serial No. 633,258. Patented March 26, 1912.

1,021,067. Sprinkling apparatus. George D. Parker, Riverside, Calif. Filed July 1, 1911. Serial No. 636,511. Patented March 26, 1912.

1,021,082. Expansion-joint. William Wright, Chicago, Ill. and Harris F. Hall, Chicago Heights, Ill. Filed September 27, 1911. Serial No. 651,564. Patented March 26, 1912.

1,021,488. Bascule-bridge. Albert H. Scherzer, Chicago, Ill. Filed July 30, 1907. Serial No. 386,254. Patented March 26, 1912.

1,021,517. Wheeled scraper. William M. Gentle, Greenwood, Ind., and Joseph K. Cooper, Indianapolis, Ind. Filed August 30, 1909. Serial No. 515,159. Patented March 26, 1912.

1,021,569. Composition for waterproofing concrete. Walter C. Bladen, Newark, N. J., assignor to Aaron C. Horn, New York, N. Y. Filed December 30, 1911. Serial No. 668,634. Patented March 26, 1912.

1,021,777. Excavating-machine. Frank E. Horning, Wayne County, Ind. Filed May 27, 1911. Serial No. 629,888. Patented April 2, 1912.

1,022,206. Spraying-machine. William O. Quest, Pittsburgh, Pa. Filed September 2, 1910. Serial No. 580,245. Patented April 2, 1912.

1,022,285. Machine for making cement pipes of any sectional form. Ferdinand Wienberg, Copenhagen, and Lars Jorgensen, Carsten Lespersen, and Jorgen Kristian Jorgensen, Elsinore, Denmark. Filed October 20, 1910. Serial No. 588,136. Patented April 2, 1912.

1,022,495. Material or composition and article made therefrom. Auguste R. Muller, London, England, assignor to R. M. D. Syndicate, Ltd., London, England. Filed May 8, 1911. Serial No. 625,837. Patented April 9, 1912.

1,022,578. Portable rock-drill. George H. Bibb, Silverton, Colo. Filed October 17, 1910. Serial No. 587,556. Patented April 9, 1912.

1,022,768. Levee-machine. William R. Bordges, Salinas, Calif. Filed April 4, 1911. Serial No. 618,915. Patented April 9, 1912.

1,022,804. Wheeled scraper. George M. Wallace, Yuba City, Calif. Filed May 22, 1911. Serial No. 628,715. Patented April 9, 1912.

1,022,843. Ditching-machine and tile-distributer. Albertus E. Hanson, Mason City, Iowa. Filed February 16, 1911. Serial No. 608,885. Patented April 9, 1912.

1,022,960. Adjustible mold for culverts and bridges. Peter C. Merillat, Winfield, Iowa. Filed November 16, 1911. Serial No. 660,641. Patented April 9, 1912.

1,023,057. Grading-machine. Carl O. Wold, Minneapolis, Minn. Filed May 22, 1911. Serial No. 628,752. Patented April 9, 1912.

1,023,068. Road-scraper. Erle W. Chinn and Joseph T. Harris, Columbia, Mo. Filed September 16, 1909. Serial No. 518,094. Patented April 9, 1912.

1,023,156. Ditching-machine. Charles Kosmin, Arlington Heights, Ill. Filed August 10. 1910. Serial No. 576,506. Patented April 16. 1912.

1,023,210. Surface scraper or grader. Lemon M. Linder, Matthews, Ind. Filed June 5, 1911. Serial No. 631,364. Patented April 16, 1912.

1,023,356. Excavating-machine. Charles E. Bathrick, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed January 12, 1911. Serial No. 602,360. Renewed September 5, 1911. Serial No. 647,799. Patented April 16, 1912.

1,023,370. Excavating-bucket. Francis G. Frink, Seattle, Wash. Filed October 10, 1911. Serial No. 653,894. Patented April 16, 1912.

1,023,373. Surveying instrument. Emery E. Graham, Denver, Colo. Filed May 12, 1910. Serial No. 560,863. Patented April 16, 1912.

1,023,399. Road-grading machine. Patrick L. Stacker, Greenwood, S. C. Filed December 7, 1911. Serial No. 664,389. Patented April 16, 1912.

1,023,421. Road-drag. Roy W. Eifert and Carl F. Eifert, Huntsville, Ill. Filed April 25, 1911. Serial No. 623,211. Patented April 16, 1912.

1,023,429. Core for making concrete culverts. John W. Kempf, Goehner, Nebr. Filed November 22, 1911. Serial No. 661,831. Patented April 16, 1912.

1,023,517. Rotation device for rock-drills. Charles C. Hansen, Easton, Pa., assignor to Ingersoll-Rand Company, New York, N. Y. Filed June 30, 1908. Serial No. 441,214. Patented April 16, 1912.

1,023,571. Trench-digging machine. John Lapin, New York, N. Y. Filed January 12, 1911. Serial No. 602,143. Patented April 16, 1912.

1,023,736. Rock-picker for picking up rocks, etc. Joseph Harman, Hambleton, W. Va. Filed June 14, 1911. Serial No. 633,035. Patented April 16, 1912.

1,023,750. Grader. Lawrence N. Morscher, Enterprise, Kans., assignor to himself and William J. Ehrsam, cotrustees, Enterprise, Kans. Filed April 13, 1908. Serial No. 426,734. Patented April 16, 1912.

1,023,781. Bridge structure. Aaron D. Kerstetter, Oriental, Pa., I. W. Kerstetter, administrator of said Aaron D. Kerstetter, deceased. Filed January 28, 1910. Serial No. 540,555. Patented April 16, 1912.

1,024,497. Crushing-machine. Charles G. Buchanan, Brooklyn, N. Y. Filed December 27, 1907. Serial No. 408,246. Patented April 30, 1912.

1,024,574. Device for the facilitation of the exchange of bores in rock-drills. Frederik Christian Andreas Herstad, Finspang, Sweden. Filed January 4, 1910. Serial No. 536,267. Patented April 30, 1912.

1,025,186. Culvert. Thomas A. Hill, Brooklyn, N. Y., assignor to the Burch Plow Works Company, Crestline, Ohio. Filed December 28, 1911. Serial No. 668,258. Patented May 7, 1912.

1,025,327. Culvert. Henry I. Standley, Hope, N. D. Filed January 30, 1912. Serial No. 674,313. Patented May 7, 1912.

1,025,569. Road-grading and excavating machine. Elijah A. Hollenbeck, Holdrege, Nebr., assignor to the Hollenbeck Manufacturing Company, Holdrege, Nebr. Filed March 29, 1910. Serial No. 552,229. Patented May 7, 1912.

1,025,646. Apparatus for sanding roads. Henry P. Roberts, Boston, Mass. Filed August 13, 1910. Serial No. 577,115. Patented May 7, 1912.

1,026,886. Rock-drill. Martin E. Thomas, Bowling Green, Ky., assignor of three-fourths to Willis W. Hester and Baley P. Belk, Bowling Green, Ky. Filed December 7, 1910. Serial No. 596,155. Patented May 21, 1912.

1,026,891. Hand-rammer. Franz Wegener, Halle, Germany. Filed January 18, 1912. Serial No. 671,996. Patented May 21, 1912.

1,027,176. Collapsible form for concrete culverts. William Burgner, Carthage, Ill. Filed September 28, 1911. Serial No. 651,739. Patented May 21, 1912.

1,027,300. Dynamometer for measuring forces. George Wazau, Geithain, Germany. Filed July 6, 1911. Serial No. 637,226. Patented May 21, 1912.

1,027,334. Paving plant. Frederick A. Hetherington, Indianapolis, Ind. Filed August 14, 1908. Serial No. 448,564. Patented May 21, 1912.

1,027,477. Lift-bridge. John L. Harrington, Kansas City, Mo. Filed October 14, 1910. Serial No. 587,050. Patented May 28, 1912.

1,027,478. Lift-bridge. John L. Harrington, Kansas City, Mo. Filed November 7, 1910. Serial No. 591,108. Patented May 28, 1912.

1,027,725. Road-grader. August J. Hansen, Walnut, Iowa. Filed August 8, 1910. Serial No. 576,165. Patented May 28, 1912.

1,027,872. Process of making skittle-grounds. Otto K. A. Manthe, Neider-Planitz, near Zwickau, Germany. Filed December 26, 1911. Serial No. 667,931. Patented May 28, 1912.

1,028,060. Road-grading machine. Orva D. Park, Mount Sterling, Iowa. Filed July 18, 1911. Serial No. 639,127. Patented May 28, 1912.

1,028,190. Traction-engine. Oscar McG. Cox, Plainview, Texas. Filed May 27, 1910. Serial No. 563,813. Patented June 4, 1912.

1,028,288. Liquid-hydrocarbon distributer for roads. David Schoentag, Glasco, and Elmer J. Latus, Albany, N. Y. Filed January 19, 1911. Serial No. 603,543. Patented June 4, 1912.

1,028,420. Paving. Edward Alcott, Manassas, Va. Filed March 12, 1912. Serial No. 683,251. Patented June 4, 1912.

1,028,501. Road-engine. George B. Selden, Rochester, N. Y. Filed May 8, 1879. Divided and this application filed September 7, 1895. Serial No. 561,733. Patented June 4, 1912.

1,028,638. Metallic culvert. Karl J. Thorsby, Oakland, Calif., assignor to California Corrugated Culvert Company, Oakland, Calif. Filed February 14, 1912. Serial No. 677,610. Patented June 4, 1912.

1,028,734. Ditcher and grader. George W. Jory, Marysville, Calif. Filed May 27, 1911. Serial No. 629,822. Patented June 4, 1912.

1,028,802. Buffer for use with wood paving. George T. Vallee, Paris, France. Filed May 13, 1910. Serial No. 561,117. Patented June 4, 1912.

1,028,829. Culvert. Arvid Reuterdahl, Boise, Idaho. Filed May 3, 1911. Serial No. 624,831. Patented June 4, 1912.

1,028,830. Culvert. Arvid Reuterdahl, Boise, Idaho. Filed October 7, 1911. Serial No. 653,441. Patented June 4, 1912.

1,029,498. Ditching-machine. Henry W. Gribler and Arthur G. Gribler, Van Wert, Ohio. Filed December 22, 1911. Serial No. 667,269. Patented June 11, 1912.

1,029,855. Rock-drill. David C. Demarest, San Francisco, Calif. Filed November 1, 1910. Serial No. 590,120. Patented June 18, 1912.

1,029,953. Cementitious material. Henry S. Spackman, Ardmore, Pa., and Ellis W. Lazell Wilmington, Del., assignors by mesne assignments, to Henry S. Spackman, Ardmore, Pa. Filed March 29, 1909. Serial No. 486,432. Patented June 18, 1912.

1,029,954. Cementitouis material. Henry S. Spackman, Ardmore, Pa., and Ellis W. Lazell, Wilmington, Del.; said Lazell assignor to said Spackman. Filed July 11, 1911. Serial No. 637,903. Patented June 18, 1912.

1,030,114. Binder or cementing material. James M. Neil, Toronto, Ont., Canada, assignor to Alexander M. Hay, Toronto, Ont., Canada. Filed September 5, 1911. Serial No. 647,472. Patented June 18, 1912.

1,030,287. Road-scarifier. Norman DeWind, Chicago, Ill., assignor to Austin Manufacturing Company, Chicago, Ill. Filed October 30, 1911. Serial No. 657,396. Patented June 25, 1912.

1,030,298. Culvert. Charles Haines, Canton, Ohio, assignor to The Canton Culvert Company, Canton, Ohio. Filed November 13, 1911. Serial No. 659,905. Patented June 25, 1912.

1,030,590. Concrete roof-tile. Fred Latulip, Syracuse, N. Y., assignor of one-half to Antoine F. Vadebonceur, Syracuse, N. Y. Filed March 6, 1911. Serial No. 612,436. Patented June 25, 1912.

1,031,033. Waterproofing compound. Aaron C. Horn, New York, N. Y. Filed December 30, 1911. Serial No. 668,617. Patented July 2, 1912.

1,031,227. Manufacture of asphalt blocks, slabs, and the like. Carl Artmann, Worms, Germany, assignor to the Firm of Chemische Fabriken and Asphaltwerke Aktien-Gesellschaft, Worms, Germany. Filed December 23, 1911. Serial No. 667,448. Patented July 2, 1912.

1,031,333. Safety-grate for bascule-bridges. Casper Faust, Oshkosh, Wis. Filed March 5, 1912. Serial No. 681,774. Patented July 2, 1912.

1,031,553. Drag. Marshall J. Hill, St. Joseph, Wis. Filed September 8, 1910. Serial No. 580,959. Patented July 2, 1912.

1,031,788. Excavating-machine. Martin C. Hanson, Brager, Minn. Filed January 30, 1912. Serial No. 674,335. Patented July 9, 1912.

1,031,919. Road-scraper. John M. Elliott, Dellroy, Ohio. Filed July 12, 1911. Serial No. 638,176. Patented July 9, 1912.

1,032,031. Earth pushing and distributing machine. Frank O. Smith, Steele, N. D. Filed April 29, 1911. Serial No. 624,188. Patented July 9, 1912.

1,032,684. Road-machine. John H. Keller, Van Buren Township, Keokuk County, Iowa. Filed April 14, 1910. Serial No. 555,379. Patented July 16, 1912.

1,032,845. Excavator. Nels A. Lybeck, Hog Island, R. I. Filed December 23, 1909. Serial No. 534,959. Patented July 16, 1912.

1,032,858. Brick pavement. Charles C. Pettit, Greenford, Ohio. Filed July 22, 1910. Serial No. 573,212. Patented July 16, 1912.

1,032,879. Oiling attachment for street-sprinklirs. Robert E. Carlton and Stuart Y. Culley, Covington, Ky. Filed May 16, 1911. Serial No. 627,465. Patented July 16, 1912.

1,033,038. Apparatus for oiling roads. George M. Saybolt, Jersey City, N. J., assignor to Standard Oil Company, New York, N. Y. Filed October 12, 1909. Serial No. 522,265. Patented July 16, 1912.

1,033,131. Portable apparatus for heating a binder for road construction. Matthew Van Alstyne, Albany, N. Y. Filed April 18, 1911. Serial No. 621,748. Patented July 23, 1912.

1,033,431. Expansion-joint for concrete pavements. Martin R. McCarthy, Davenport, Iowa. Filed February 2, 1912. Serial No. 674,957. Patented July 23, 1912.

1,033,551. Road cleaner and smoother. George U. Davis, Indianapolis, Ind. Filed October 28, 1910. Serial No. 589,531. Patented July 23, 1912.

1,033,751. Asphalt-block cooler. George E. Whitney, Yonkers, N. Y., assignor to the International Pavement Company, Hartford, Conn. Filed November 5, 1909. Serial No. 526,364. Patented July 23, 1912.

1,033,872. Surfacing-machine. George Burwell, Lansing, Mich. Filed September 10, 1908. Serial No. 452,472. Patented July 30, 1912.

1,034,033. Paving brick or block. James M. Porter, Pittsburgh, Pa. Filed July 3, 1911. Serial No. 636,576. Patented July 30,1912.

1,034,074. Cement curb and gutter mold. James S. W. Cannell, Shenandoah, Iowa. Filed September 12, 1911. Serial No. 648,933. Patented July 30, 1912.

1,034,203. Process of agglomerating materials. Paul Claes, Brussels, Belgium. Filed December 27, 1909. Serial No. 535,142. Patented July 30, 1912.

1,034,504. Reinforcing and protecting device for street-pavements. William M. Pindell, Chicago, Ill. Filed January 3, 1911. Serial No. 600,497. Patented August 6, 1912.

1,035,026. Reinforced arch-bridge. James B. Marsh, Des Moines, Iowa. Filed November 1, 1911. Serial No. 658,060. Patented August 6, 1912.

1,035,037. Curb-shaping tool. Emil Olson, Rockford, Ill. Filed March 11, 1912. Serial No 682,917. Patented August 6, 1912.

1,035,041. Adjustable crusher-head for rock-crushers. Edward L. Pemberton, New Haven, Conn., assignor to Edgar Allen American Manganese Steel Company, Augusta, Me. Filed February 13, 1912. Serial No. 677,310. Patented August 6, 1912.

1,035,335. Road-roller. James C. Findlay, Marquette, Mich. Filed January 6, 1912. Serial No. 669,736. Patented August 13, 1912.

1,035,787. Method of making pavements, roads or streets, and cellar-floors or the like. William T. Headley, Philadelphia, Pa., assignor to Headley Good Roads Company, Wilmington, Del. Filed September 27, 1911. Serial No. 651,543. Patented August 13, 1912.

1,036,068. Device for placing concrete in forms. Lawrence C. Brink, Elmsford, N. Y. Filed February 6, 1911. Serial No. 606,700. Patented August 20, 1912.

1,036,187. Cement sidewalk construction. Daniel J. Cable, Pittsburgh, Pa., assignor of one-half to John A. Harper, Pittsburgh, Pa. Filed May 10,1909. Serial No. 494,974. Patented August 20, 1912.

1,036,546. Culvert. George A. Belding, Missoula, Mont. Filed October 31, 1911. Serial No. 657,717. Patented August 27, 1912.

1,036,673. Rock-drill bit. Abijah S. Meguire, Chicago, Ill. Filed January 8, 1912. Serial No. 669,919. Patented August 27, 1912.

1,036,712. Process for producing cementitious products. Samuel W. Ramsey, Kent, Ohio. Filed February 18, 1911. Serial No. 609,385. Patented August 27, 1912.

1,036,898. Method of rendering cement mortar and concrete waterproof. Roy A. Plumb, Detroit, Mich., assignor to Trussed Concrete Steel Company Detroit, Mich. Filed January 2, 1912. Serial No. 669,007. Patented August 27, 1912.

1,037,194. Road-scraper. Johann F. T. Berger, Mount Clemens, Mich. Filed April 15, 1912. Serial No. 690,693. Patented September 3, 1912.

1,037,281. Road-grading machine. Christian Maves, Davenport, Iowa. Filed November 6, 1911. Serial No. 658,900. Patented September 3, 1912.

1,037,375. Road-scraper. William Volant, Garnet, Wis. Filed February 8, 1912. Serial No. 676,462. Patented September 3, 1912.

1,037,429. Excavator. Morton G. Bunnell, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed September 28, 1908. Serial No 455,022. Patented September 3, 1912.

1,037,709. Culvert-pipe. Frank B. Zieg, Fredericktown, Ohio, assignor to the F. B. Zieg Manufacturing Company, Fredericktown, Ohio. Filed April 13, 1912. Serial No. 690,673. Patented September 3, 1912.

1,037,716. Curbing for railroad-tracks running along or across streets or roads. Taggart Aston, San Francisco, Calif. Filed January 12, 1911. Serial No. 602,340. Patented September 3, 1912.

1,037,755. Scarifier. Walter A. Gillette, Los Angeles, Calif., assignor to Petrolithic Pavement Company, Los Angeles, Calif. Filed May 1, 1911. Serial No. 624,498. Patented September 3, 1912.

1,037,875. Road-cutter and the like. Lee D. Craig, San Francisco, Calif. assignor to National Trenching Machine Company, Washington, D. C. Filed December 14, 1909. Serial 533,063. Renewed February 3, 1912. Serial No. 675,340. Patented September 10, 1912.

1,038,125. *Process of producing concrete*. Henry J. Harms, Orange, N. J. and George E. Small, West Orange, N. J., assignors to Monogram Construction Company. Filed July 10, 1909. Serial No. 507,005. Patented September 10, 1912.

1,038,226. *Bridge*. Joseph B. Strauss, Chicago, Ill. Filed May 1, 1911. Serial No. 624,326. Patented September 10, 1912.

1,038,340. *Road-oiler*. William H. Gailor, Saratoga Springs, N. Y. Filed May 13, 1910. Serial No. 561,062. Patented September 10, 1912.

1,038,456. *Road-drag*. William Stoops, Eau Galle, Wis. Filed October 10, 1910. Serial No. 586,222. Patented September 10, 1912

1,038,684. *Excavating and loading mechanism*. Job S. Tindall, Pueblo, Colo. Filed August 2, 1910. Serial No. 575,146. Patented September 17, 1912.

1,039,381. *Drag attachment*. Edward C. Gledhill, Galion, Ohio, assignor to Galion Iron Works Company, Galion, Ohio. Filed April 21, 1911. Serial No. 622,604. Patented September 24, 1912.

1,039,686. *Road-machine*. Franklin E. Arndt, Galion, Ohio, assignor to Galion Iron Works Company, Galion, Ohio. Filed December 27, 1911. Serial No. 668,176. Patented October 1, 1912.

1,039,884. *Road composition and method of making the same*. Thomas J. Barrett, Bordentown, N. J. Filed February 28, 1912. Serial No. 680,523. Patented October 1, 1912.

1,040,046. *Culvert*. William B. Stambaugh, Woodsboro, Md. Filed June 8, 1912. Serial No. 702,433. Patented October 1, 1912.

1,040,304. *Excavator*. John Gallagher, Madison, Wis. Filed May 2, 1911. Serial No. 624,666. Patented October 8, 1912.

1,040,442. *Metal Culvert*. William T. Shannon, Cincinnati, Ohio. Filed July 19, 1912. Serial No. 710,347. Patented October 8, 1912.

1,040,544. *Rock-drill*. Charles A. Hultquist, Los Angeles, Calif. Filed February 19, 1912. Serial No. 678,700. Patented October 8, 1912.

1,040,650. *Traction-engine*. Richard C. De Witt, Sutter, Calif. Filed November 15, 1911. Serial No. 660,391. Patented October 8, 1912.

1,040,731. *Paving-joint*. Thomas L. Moore, New York, N. Y. Filed January 23, 1912. Serial No. 672,871. Patented October 8, 1912.

1,040,888. *Spreader*. Alonzo B. Comrie, Penn Yan, N. Y. Filed January 23, 1912. Serial No. 672,813. Patented October 8, 1912.

1,041,226. *Machine for cleaning, drying, heating, and mixing tarred macadam*. Richard Ames, Brighton, England. Filed August 29, 1911. Serial No. 646,752. Patented October 15, 1912.

1,041,320. *Tool for marking cement pavements*. Loren W. McIntyre, Portland, Ore. Filed August 8, 1911. Serial No. 643,021. Patented October 15, 1912.

1,041,359. *Safety drawbridge attachment*. Edward F. Schoenthaler, Long Branch, N. J. Filed February 11, 1911. Serial No. 607,908. Patented October 15, 1912.

1,041,387. *Grading-machine*. Raymond Waterman, Minneapolis, Minn. Filed January 9, 1911. Serial No. 601,645. Patented October 15, 1912.

1,041,564. *Solidification of hydrocarbon oils*. James T. Armstrong, London, and James Mordan, Hughenden, England. Filed May 4, 1912. Serial No. 695,142. Patented October 15, 1912.

1,041,578. *Art of paving*. John A. Bell, George R. Wilson, and George P. Griffith, Los Angeles, Calif. Filed May 5, 1909. Serial No. 494,127. Patented October 15, 1912.

1,041,603. *Excavating-machine*. Franklin J. Dearborn, Oakland, Calif. Filed June 6, 1910. Serial No. 565,403. Renewed September 9, 1912. Serial No. 719,459. Patented October 15, 1912.

1,041,604. Process for preparing and oil suitable for impregnating porous bodies. Julius Dehnst, Halensee, near Berlin, Germany. Filed June 20, 1911. Serial No. 634,317. Patented October 15, 1912.

1,041,885. Bascule-bridge. Albert H. Scherzer, Chicago, Ill. Filed July 30, 1907. Serial No. 386,256. Patented October 22, 1912.

1,042,067. Bridge for single-tract railways. Steven Zsinko, Los Angeles, Calif. Filed April 17, 1912. Serial No. 691,518. Patented October 22, 1912.

1,042,230. Combined traction stone-crusher and road-roller. Elmer Hubbard, Gilboa, N. Y. Filed January 13, 1912. Serial No. 670,986. Patented October 22, 1912.

1,042,238. Lock for bascule-bridges. Herman C. Krase, Chicago, Ill. Filed March 14, 1912. Serial No. 683,730. Patented October 22, 1912.

1,042,450. Road-scraper. Elisha R. Kerr, Erin, Tenn. Filed July 29, 1911. Serial No. 641,292. Patented October 29, 1912.

1,042,474. Road-making and binding materials therefor. Edward A. Paterson, Port Arthur, Ont., Canada. Filed January 9, 1912. Serial No. 670,341. Patented October 29, 1912.

1,042,776. Safety-gate for bascule-bridges. Casper Faust, Oshkosh, Wis. Filed March 5, 1912. Serial No. 681,774. Divided and this application filed May 7, 1912. Serial No. 695,655. Patented October 29, 1912.

1,042,822. Apparatus for laying concrete courses. Ernest L. Ransome, New York, N. Y. Filed November 14, 1908. Serial No. 462,542. Patented October 29, 1912.

1,042,860. Road-sweeping machine. John T. Whittome, Tavistock, England. Filed April 4, 1911. Serial No. 618,792. Patented October 29, 1912.

1,043,113. Excavating-machine. Leo A. Krupp, Carey, Ohio, assignor of one-half to Peat Industries, Ltd., Montreal, Canada. Filed April 14, 1911. Serial No. 621,125. Patented November 5, 1912.

1,043,302. Rock-drill. Henry Deitz, Denver, Colo. Filed June 2, 1905. Serial No. 263,365. Renewed February 27, 1909. Serial No. 480,469. Patented November 5, 1912.

1,043,303. Process of treating waste sulfite liquor. Walter H. Dickerson, Muskegon, Mich., assignor to Tanning Extract Company, New York, N. Y. Filed May 25, 1909. Serial No. 498,304. Patented November 5, 1912.

1,043,497. Bridge-clamp. Coleman W. Abernethy, Pioneer Mills, N. C. Filed June 27, 1912. Serial No. 706,155. Patented November 5, 1912.

1,044,090. Excavating-machine. Le Roy K. Sherman, Chicago, Ill. Filed October 9, 1908. Serial No. 456,966. Patented November 12, 1912.

1,044,279. Excavator. Winfield S. Smith, Forest, Ohio, assignor of one-half to Andrew Lyle and Walter H. Phelps, Forest, Ohio. Filed February 9, 1912. Serial No. 676,505. Patented November 12, 1912.

1,044,325. Rock and ore crusher. Theodor Willma, Milwaukee, Wis., assignor of one-eighth to Martin Walski and one-eight to Stanislaw Kielar, Milwaukee, Wis. Filed February 16, 1911. Serial No. 608,952. Divided and this application filed November 27, 1911. Serial No 662,560. Patented November 12, 1912.

1,044,337. Rock-drill. Thomas J. Barbre and James G. Trefz, Denver, Colo., assignors to Western Machinery and Manufacturing Company, Filed May 15, 1911. Serial No. 627,145. Patented November 12, 1912.

1,044,394. Core for making concrete culverts. John W. Kempf, Goehner, Nebr. Filed April 23, 1912. Serial No. 692,622. Patented November 12, 1912.

1,044,589. Rammer. Raleigh H. Staley, Springfield, Ill. Filed March 27, 1909. Serial No. 486,265. Patented November 19, 1912.

1,044,790. Rock-drilling machine. Paul Lange, Brieg, near Breslau, Germany. Filed February 16, 1909. Serial No. 478,196. Patented November 19, 1912.

1,045,286. Composition for constructing roads or pavements. William T. Headley, Philadelphia, Pa., assignor to Headley Good Roads Company, Wilmington, Del. Filed October 22, 1910. Serial No. 588,525. Patented November 26, 1912.

1,045,328. Paving-block. Albert V. Sammis, Huntington, N. Y. Filed March 3, 1911. Serial No. 611,996. Patented November 26, 1912.

1,046,572. Spraying device. Theodore Eder, Perkins, Calif., assignor to the people of the United States. Filed March 20, 1909. Serial No. 484,784. Patented December 10, 1912.

1,046,635. Construction of road-beds and railroad-tracks. Gregory Perkins Sr., Los Angeles, Calif. Filed September 9, 1912. Serial No. 719,335. Patented December 10, 1912.

1,045,946. Road-oil heater and distributer. John T. Beatty and William M. Beatty, Charlotte, N. C. Filed March 8. 1912. Serial No. 682,482. Patented December 10, 1912.

1,047,619. Machine for heating and distributing materials. Jacob F. Decker, Albany, N. Y. Filed April 2, 1912. Serial No. 688,049. Patented December 17, 1912.

1,048,165. Apparatus for surfacing roads and the like. Charles E. Horne, Millbury, Mass., and Charles D. Parker, Worcester, Mass. Filed March 6, 1911. Serial No. 612,608. Patented December 24, 1912.

1,048,243. Road-scraper. John W. Wallace, Cuero, Texas. Filed April 15, 1912. Serial No. 690,839. Patented December 24, 1912.

1,048,408. Ditching-machine. Albertus E. Hanson, Mason City. Iowa. Filed March 16, 1912. Serial No. 684,103. Patented December 24, 1912.

TRADE NAMES

Road Materials

Acme Asphalt: Trade name given to asphalt cement produced by Warren Brother Company, 59 Temple Place, Boston, Massachusetts (advertisement page 191).

Agasco: A refined road tar manufactured by the Atlanta Gas Light Company, Electric and Gas Building, Atlanta, Georgia.

Asfaltoil: Gulf Refining Company, 514 Battery Park, New York, New York. The trade name for several grades of fluid reduced petroleums for use in the surface treatment of roads.

Asphaltoilene: Alden Speare's Sons Company, Boston, Massachusetts. The trade name of several grades of reduced and residual petroleums and oil asphalt manufactured by this company for use in hot and cold surface treatment and in the construction of roads.

Aztec: United States Asphalt Refining Company, 90 West Street, New York, New York. An oil asphalt produced from Mexican crude petroleum (advertisement page 195).

Bermudez Road Asphalt: Barber Asphalt Paving Company, Philadelphia, Pennsylvania. Fluxed Bermudez Lake asphalt for use in road construction (advertisement page 176).

Bicomac: Headley Good Roads Company, Real Estate Trust Building, Phildelphia, Pennsylvania. An emulsified bitumen which is diluted with water and mixed with Portland cement concrete in the surfacing of roads (advertisement page 196).

Bitulithic: Warren Brothers Company, 59 Temple Place, Boston, Massachusetts. Trade name of a patented pavement construction consisting of varying sizes of crushed stone or gravel mixed with bituminous cement, the sizes of crushed stone varying from a maximum which is about one-half the depth of the pavement surface (which surface is generally 2 inches deep) to impalpable powder, being so prepared as to give a high degree of density and low percentage of voids (advertisement page 191).

Bitustone Double Bond: A pavement construction patented by August E. Schutte of Northboro, Massachusetts, consisting of a concrete foundation of a depth of about 3½ inches, and bonding course about 1½ inches and the spaces in the bonding course filled and the surface coated with asphaltic cement, prepared for the purpose, the surface finally finished with crusher screenings or coarse sand spread into the hot bitumen The bonding course is made of neat cement and nearly uniform size stone or gravel (preferably 1 inch to 1½ inches in size), in proportion of one part cement to six parts stone or gravel.

Byerlyte: Byerley & Sons, 2484 West Fourth Street, Cleveland, Ohio. Several grades of oil asphalt for use in road construction.

Carbo-Via: Continental Bitumen Company, Toledo, Ohio. A refined coal tar product.

Chicago AA: A Brand of Portland Cement manufactured by the Chicago Portland Cement Company, Chicago and Oglesby, Illinois (advertisement page 193).

Cubanel: International Asphalt Company, Chamber of Commerce Building, Chicago, Illinois. A fluxed Cuban asphalt for use in paving and road construction.

Dolarway Pavement: Dolarway Paving Company, Whitehall Building, New York, New York. Consists of 5 or 6 inches of concrete covered with Dolarway bitumen and sand. The bitumen coat protects the concrete from water and traffic and can be occasionally renewed (advertisement page 180).

Double Bond Cement: Warren Brothers Company, 59 Temple Place, Boston, Massachusetts. Trade name given to the asphalt cement used for the bonding course of the Bitustone Double Bond Pavement (advertisement page 191).

Dustoline: The Dustoline for Roads Company, Summit, New Jersey. The copyrighted, trademark name of a transparent, reddish colored compound, of refined, nonasphaltic petroleum products, used as a dust preventive and road preserver (advertisement page 197).

Fairfield: The Impervious Product Company, 400 E. Fayette Street, Baltimore, Maryland. The trade name for the products of this company, such as "Anti-Dust," "Road Binders," and "Fairfield Asphalt." The latter, which forms the basis of their other products, is said to come from a neutralized and weathered sludge acid deposit.

Glutrin: Robeson Process Company, Pennington, New Jersey. An adhesive liquor containing organic acids manufactured from the lignone compounds produced in the making of wood pulp by the sulfite process (advertisement page 192).

Hassam Pavement: Hassam Paving Company, Worcester, Massachusetts. A patented form of concrete pavement constructed by grouting the rolled stone with a fluid grout of sand and Portland cement (advertisement page 194).

Hydrolene: The Sun Company, 1421 Chestnut Street, Philadelphia, Pennsylvania. Oil asphalts for use in road construction (advertisement page 196).

Indian: Indian Refining Company, 17 Battery Place, New York. The trade name for several grades of reduced and residual petroleums and oil asphalt for use in hot and cold surface treatment and in the construction of roads.

Kyrock: Wadsworth Stone and Paving Company, Lambert Street, and Penna. R. R., Pittsburgh, Pennsylvania. A natural rock asphalt found in Kentucky (advertisement page 190).

Neuchatel: The Neuchatel Asphalte Company, Ltd., 291 Broadway, New York. A rock asphalt mined at the Val de Travers mines located at Canton of Neuchatel, Switzerland.

Pioneer: American Asphaltum and Rubber Company, 600–14 Harvester Building, Chicago, Illinois. Several grades of oil asphalt containing Gilsonite, for use in road construction.

Prime White Road Oil: Prime White Road Oil Company, First National Bank Building, Cincinnati, Ohio. A colorless petroleum distillate for use as a dust layer.

Rocmac: Rocmac Ltd. Inc., North Tonawanda, New York. A chemical mixture containing silicate of soda, sugar, powdered limestone, and other ingredients with which the upper course in macadam or gravel construction is puddled.

Sarco: Standard Asphalt and Rubber Company, First National Bank Building, Chicago, Illinois. Several grades of asphalt containing Gilsonite, for use in road construction.

Sarcolithic: Standard Asphalt and Rubber Company, First National Bank Building, Chicago, Illinois. The trade name for a form of pavement consisting of a graded crushed stone aggregate which is mixed with Sarco Asphaltic Cement.

Standard: Standard Oil Company of New York, and Standard Oil Company of New Jersey, 26 Broadway, New York. "Standard Refined Mexican Asphalt," "Standard Macadam Asphalt Binders," "Standard Asphalt Road Oils," prepared by this Company for use in sheet asphalt paving, bituminous macadam construction and cold surface treatment of macadam and gravel roads (advertisements pages 184 and 186).

Tarite: The American Tar Company, Malden, Massachusetts. A refined coal tar product for use in road construction. "Tarite Asphalt" is a refined coal tar containing a certain percentage of oil asphalt. "Tarine," a refined tar preparation for use in construction work or in surface treatments (advertisement page 197).

Taroid: The F. J. Lewis Manufacturing Company, 2505 South Robey Street, Chicago, Illinois. A refined coal tar product.

Tarvia: Barrett Manufacturing Company, 17 Battery Place, New York, New York. A trade name of this Company for their tar products used for road purposes. "Tarvia A" for hot surface treatment: "Tarvia B" for cold surface treatment: "Tarvia X" for penetration or mixing method in road construction (advertisement page 177).

Tasscoil: The Alden Speare's Sons Company, Boston, Massachusetts. A colorless oil distillate for use as a dust layer.

Terracolio: Headley Good Roads Company, Real Estate Trust Building, Philadelphia, Pennsylvania. An emulsified semi-asphaltic oil which may be diluted and used in the surface treatment of roads (advertisement page 196).

Texaco: The Texas Company, 17 Battery Place, New York, New York. All the Texaco road products are marketed under the registered trade name "Texaco." They are "Texaco Road Oil for Cold Application," "Texaco Road Oil for Hot Application," "Texaco Liquid Asphalt," "Texaco Macadam Binder," "Texaco Road Asphalt," "Texaco Paving Filler," "Texaco Paving Cement" (advertisement page 187).

Trinidad Liquid Asphalt: Barber Asphalt Paving Company, Land Title Building, Philadelphia, Pennsylvania. Natural liquid asphalt for the surface treatment of roads, obtained from the Island of Trinidad; "A" to be used cold; "B" to be applied hot (advertisement page 176).

Ugite: The United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania. The trade name for fluid and semi-solid refined water-gas tar for use in surface treatment and construction. "No. 1" is applied cold as a dust layer; "No. 2" is applied hot for surface treatment; "No. 3" is recommended for construction by the penetration method; "No. 4" is recommended for construction by the mixing method (advertisement page 226).

Union Paving Asphalt and Maltha Brand: Union Oil Company of California, Mills Building, San Francisco. Oil asphalt refined from heavy California crudes of between 12 and 16 gravity Beaume.

Warrenite: Warren Brothers Company, 59 Temple Place, Boston, Massachusetts. A modification of the bitulithic city pavement adapted to meet the traffic conditions of country roads (advertisement page 191).

Westrumite: The Westrumite Company, Whiting, Indiana: The Alantic Westrumite Company, Washington, D. C. An aqueous emulsion of native bitumens used cold as a binder in road construction in the following ways: (1) By mixing method (2) By penetration method (3) By surface treatment (4) As a dust layer (advertisement page 174).

Road Machinery

Acme: Trade name given road machines manufactured by the Acme Road Machinery Company, Frankfort, New York.

Acme: Trade name given to metal culverts manufactured by The Canton Culvert Company, Canton, Ohio.

Ajax: Trade name given to engines used for operating crusher plants manufactured by the A. B. Farquhar Company, York, Pennsylvania.

Atlantic: Trade name given to steam shovels manufactured by the Bucyrus Company, South Milwaukee, Wisconsin (advertisement page 196).

Atlapump: Trade name given to a pump engine manufactured by the Harold L. Bond Company, 78 H Beach Street, New York, New York.

Aurora: Trade name given to jaw rock crusher and dump wagon manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198).

Austin: Trade name given to motor rollers, gyratory crusher, sprinkler and reversible grader manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198).

Austin Giant: Trade name given to grader manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198).

Bucyrus: Trade name given to a steam shovel manufactured by the Bucyrus Company, South Milwaukee, Wisconsin (advertisement page 196).

Buffalo Pitts: Trade name given Ddl. Cyl. Two-Speed Steel Gear Road Locomotives, Contractors Special Traction Engines, Contractors Gasoline Tractors, Reversible Stone Spreading Cars—Steel Frame, Reversible Stone Spreading Cars—Wood Frame, Buffalo Pitts Road Freight Cars, and Automobile Trailers. Buffalo Pitts Company, Buffalo, New York (advertisement page 199).

Busy Bee: Trade name given to hammer drills manufactured by the McKiernan-Terry Drill Company, U. S. Realty Building, New York, New York.

Butterfly: Trade name given a rock drill manufactured by the Ingersoll-Rand Company, 11 Broadway, New York, New York.

Climax: Trade name given to a steel reversible road machine and a rock crusher sold by the Good Roads Machinery Company, Inc., Marathon, New York (advertisement page 201).

Climax Jumbo: Trade name given a heavy road machine sold by the Good Roads Machinery Company, Inc., Marathon, New York (advertisement page 201).

Columbian: Trade name given to dump wagons and carts manufactured by the Columbia Wagon Company, Columbia, Pennsylvania.

Cube: Trade name given to concrete mixer manufactured by the Municipal Engineering and Contracting Company, Railway Exchange Building, Chicago, Illinois.

Double Shell: Trade name given to dryers manufactured by the Ruggles-Coles Engineering Company, 50 Church Street, New York, New York.

Electric-Air: Trade name given to rock drills manufactured by the Ingersoll-Rand Company, 11 Broadway, New York, New York.

Everett: Trade name given to portable dumping box manufactured by the Everett Manufacturing Company, Newark, New York.

Force-Feed: Trade name given to the rock crusher manufactured by the Universal Crusher Company, Box 678, Cedar Rapids, Iowa.

Glide: Trade name given to graders manufactured by the Glide Road Machine Company, Minneapolis, Minnesota.

Hvass: Trade name given to scarifier manufactured by the Chas. Hvass Company, East 18th and 19th Streets, Avenues A and B, New York, New York (advertisement page 205).

Imperial: Trade name given to metal culverts manufactured by the Canton Culvert Company, Canton, Ohio.

Little Western: Trade name given to grader manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198.)

Little Winner: Trade name given a two-horse road machine sold by the Good Roads Machinery Company, Inc., Marathon, New York (advertisement page 201).

Maney Four Wheel Scraper: Trade names given to grader and scraper manufactured by the Baker Manufacturing Company, 906–907 Exchange Building, Memphis, Tennessee.

Milburn-Blatt: Trade name given to dump wagon manufactured by the Milburn Wagon Company, Toledo, Ohio.

Mogul: Trade name given to oil tractor manufactured by the International Harvester Company of America, Harvester Building, Chicago, Illinois (advertisement page 202).

Monarch: Trade name given a combination roller and traction hauling engine sold by the Good Roads Machinery Company, Inc., Marathon, New York (advertisement page 201).

New Era: Trade name given to elevating grader manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198).

Otto: Trade name given an engine manufactured by the Otto Gas Engine Works, 3411 Walnut Street, Philadelphia, Pennsylvania.

Panama Line: Trade name given to road graders, road drags and cast iron culvert pipe manufactured by the F. B. Zieg Manufacturing Company, Fredericktown, Ohio (advertisement page 223).

Pennsylvania: Trade name given to crushers manufactured by the Pennsylvania Crusher Company, Philadelphia, Pennsylvania.

Pioneer: Trade name given to dump wagon manufactured by the Austin-Western Company, Karpen Building, Chicago, Illinois (advertisement page 198).

Port Huron: Trade name given to hauling engines, spreading and dumping cars manufactured by the Port Huron Engine & Thresher Company, Port Huron, Michigan (advertisement page 208).

Reliance: Trade name given a rock crusher manufactured by the Universal Road Machinery Company, Kingston, New York.

Road King: Trade name given to a road grader manufactured by J. D. Adams & Company, Indianapolis, Indiana.

Simplex: Trade name given to concrete mixer manufactured by The Miles Manufacturing Company, Jackson, Michigan.

Simplified Continuous Mixer: Trade name given to concrete mixer manufactured by Besser Manufacturing Company, Alpena, Michigan.

Standard: Trade name given a road roller manufactured by the Port Huron Engine & Thresher Company, Port Huron, Michigan (advertisement page 208).

Tarco: Trade name given to road oiling appliances manufactured by the Tarrant Manufacturing Company, Saratoga Springs, New York (advertisement page 206).

Titan: Trade name given to oil tractors and road rollers manufactured by the International Harvester Company of America, Harvester Building, Chicago, Illinois (advertisement page 202).

The Big-an-Little: Trade name given to concrete mixers manufactured by the Jaeger Machine Company, Columbus, Ohio.

The Standard: Trade name given to a mixer manufactured by the Standard Scale & Supply Company, 243 Water Street, Pittsburgh, Pennsylvania.

The Susquehanna: Trade name given to a dump wagon manufactured by the Columbia Wagon Company, Columbia, Pennsylvania.

20th Century Grader No. 2: Trade name given to grader and scraper manufactured by The Baker Manufacturing Company, 906–907 Exchange Building, Memphis, Tennessee.

Vortex: Trade name given to pump engine manufactured by the Lawrence Pump & Engine Company, Lawrence, Massachusetts.

Vulcan: Trade names given to steam shovels manufactured by the Bucyrus Company, South Milwaukee, Wisconsin (advertisement page 196).

Western: Trade name given to elevating grader manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198).

Western Special: Trade name given to grader manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198).

Western Standard: Trade name given to grader manufactured by the Austin-Western Company, Ltd., Karpen Building, Chicago, Illinois (advertisement page 198).

PATENTED METHOD OF ROAD CONSTRUCTION

All manufacturers of road materials were requested to submit description of any patented methods of road construction which they thought should properly be included in this chapter. The information contained herein is based upon the replies received.

Bitulithic Pavement.—This pavement is laid under several patents, the basic principle United States patent being no. 727,505, issued to the late Frederick John Warren. The scope of the patent as given in the opinion in Warren Brothers Company vs. Owosso, Michigan, written by Mr. Justice Lurton, then Presiding Justice of the United States Circuit Court of Appeals, Sixth Circuit, is as follows:

> Warren's invention, shortly stated, consists in the discovery that an aggregate of large and small pieces of stone, together with a certain proportion of stone dust, all mixed together and thoroughly permeated with bitumen or asphalt, results, when set, in a compact, stable structure, is less liable to disintegrate from traffic or weather than any other method of grading or arranging the mineral constituents. Under the evidence, the particles are more compact in their relation to each other and there is a minimum of friction in their interaction. The larger pieces of stone withstand the tendency of the small grains or dust to slip by each other and change the form of the pavement by disintegration and lumpy spots. The result is, therefore, a stability due to the arrangement of the mineral structure which enables the use of a softer asphalt or bitumen than would be otherwise feasible, inasmuch as a greater proportion of the wear and strain is carried by the mineral elements than by the binding constituent.

The Bitulithic surface may be laid on any suitable substantial foundation, such as macadam, new or old; crushed stone properly compressed; concrete, either new or resurfacing foundations of old pavements; old brick; granite block or cobble stones. Bitulithic surface is described by the owners of the patents as follows:

> *Surface:* Upon the foundation is spread the wearing surface which is compressed with a heavy road roller to a thickness of 2 inches. The surface mixture is made of the best stone obtainable, varying in size from a maximum of 1 inch or 1½ inches down to an impalpable powder, the various sizes of smaller stone, sand and impalpable powder being provided to fill the spaces between eth larger stones. The proportions used of the various sizes of mineral are pre-determined by physical tests with a view to obtaining the smallest percentage of air spaces or voids in the mineral mixture, and vary with the character and shape of particles of the stone used in each particular case. After the proportions have been determined,

the mineral material is passed through a rotary dryer, from which it is carried up an elevator and through a rotary screen which separates the mineral material into its several different groups of sizes. The proper proportion by weight of each of these sizes is secured by the use of a scale having seven beams, the exact required amount being weighed out, and run into a double shaft rotary mixer. There it is combined with a bituminous cement which is also accurately weighed in the proper portion. The whole is then thoroughly mixed together and dumped, while still hot, into carts, hauled to the street and spread and thoroughly rolled with heavy steam road rollers.

Grit Surface: After the surface is thoroughly rolled, a flush coat of quick drying bituminous cement is applied to the surface, thoroughly sealing it and increasing its waterproofness. There is then applied a thin layer of finely crushed stone, varying from ¼-inch to ¾ of an inch in size, according to the roughness of the surface desired. The pavement is again thoroughly rolled, leaving the street in a finished condition.

Warrenite Road.—Warrenite Road is a modification of Bitulithic pavement adapted to meet the traffic conditions which exist on country highways.

Bitustone Double Bond Roadway.—This is laid under United States patent no. 1,001,695 issued to August E. Schutte of Northboro, Mass., on August 29, 1911. The construction is briefly described by the eighth claim of the patent, as follows:

> A pavement for foot or vehicular traffic, comprising a mineral aggregate the particles of which are in substantial contact and are otherwise surrounded and bonded together by a rigid non-liquefiable cement, the voids between the bonded mineral particles being filled with elastic cement.

The total depth of the construction recommended by the patentee is 5 inches, as follows:

1. *Foundation or Bottom Course;* of ordinary Portland cement concrete, the mineral aggregate of which may be either crushed stone, gravel, slag or other suitable material.

2. *Bonding Course;* of hard stone or gravel, of nearly uniform size, varying from about 1 inch to ½ inch mixed with neat Portland cement in the proportion of one part cement to six parts stone. The bonding course is tamped and well embedded into the mortar of the foundation or bottom course.

3. *Filler;* after the bonding course is thoroughly set, presenting particles of crushed stone strongly united with neat Portland cement, but containing large percentage of voids between the individual particles, hot bituminous cement especially prepared for the purpose, is flushed over and penetrates into the spaces of the bonding course, and while the cement is still hot the whole surface is covered with fine crusher screenings or coarse sand.

Hassam Pavement.—Upon a well compacted subgrade is spread not less than 5 inches of broken stone in sizes varying from 1½ inches to 2½ inches in diameter. The stone must be clean and fresh with no dirt. After this is rolled and brought to desired cross section the compressed stone is thoroughly grouted. The grout consists of two parts of sand to one or more parts of Portland cement. This grouting is done with a Hassam Patent Grout Mixer driven by a gasoline engine. Before the initial set takes place and during the process of grouting the road is thoroughly rolled. Upon the top of the pavement is then spread a thin layer of pea stone which is also rolled. The Hassam Paving Company, Worcester, Mass.

Patented Materials for Road Construction in which the Method of construction is not patented

To provide information concerning materials the *preparation* of which involves a patent but which are not patented as to their method of *application*, a letter was sent to all road material manufacturers asking them to submit specifications or other suitable material for a special chapter to cover these conditions. The following reports comprise all that have been received:

Amiesite.—A paving material, the ingredients of which are incorporated into a paving mass under patents issued to Joseph Hay Amies and Warren Brothers Company. It consists of the best grade of crushed stone or gravel, graded in sizes from 1½ to ¼ inch (as to give the inherent stability required for a permanent road), chemically treated before applying the asphalt and other material required for the finished product. The stone is then coated, without heating, with an asphaltic cement, composed of refined asphalt containing not less than 98 per cent bitumen and other ingredients. The run-of-the-crusher Amiesite is to be used in the first course; the second course is either ½ or ¼-inch stone, treated in the same manner except it requires additional asphalt per ton of Amiesite, known as "Amiesite Filler." The material is shipped to destination ready for immediate use, without further treatment. By way of summary, it may be stated that the ingredients of Amiesite are crushed stone, asphalt, lime and naptha.

Fibred Asphalt Pavement.—This pavement is laid under several patents, its basic principles involved being covered by United States patent 1040321, applied for April 8, 1911, and issued its patentee, George A. Henderson, of St. Albans, W. Va., on October 8, 1912. The invention relates principally to the art of denaturing hard-wood and preserving it in the following manner: a billet of hard-wood is shredded into small particles of un-uniform lengths of 1½ inches down to wood flour, the flour itself being eliminated from the aggregate by screening. The particles are denatured by the process used by the tannin extract manufacturers, in which process all sap, essence and the more evaporable and deterioble elements in the wood are extracted, the remaining particles being thereby rendered abnormally enlarged and porous. In their subsequently dried and heated condition the wood particles, because of their porosity, are susceptible of impregnation, by absorption, by a non-deterioble, non-evaporating matter (such as asphalt), in lieu of the sap, etc., removed. The heating of the dried particles, to prevent the premature congealing of the molten asphalt before reaching the particles' pores, has also for its object the partial contracting of the enlarged particles. The consequent contraction in the size of the particles' pores correspondingly reduces the amount of asphalt required to completely fill them.

The wood fiber is a waste product of tannin extract manufacturers, who use hard-wood and no bark in their process. The particles are taken from the leaches on endless belts; dried, screened, heated and then mechanically mixed with a predetermined uniform percentage of asphalt, sufficient to fill the pores and voids in the mass when finally contracted and compressed. The material, in its partially impregnated and partially contracted condition is deposited at the mouth of its mixer into moulds 4 by 6 feet, these blocks being compressed on all sides only 3 to 4 inches, and allowed to cool, when they will remain intact for shipment, but are readily disintegrated in a breaker stationed at the front of a portable reheating machine, designed to travel over the road to be paved, in which machine the coated particles are deposited and heated to from 250 to 275° F. This heating results in the final contraction of the fiber to its normal size, as it was before being chipped from its original log, and the entrapping of its asphalt content, thereby insuring penetration to the most minute pore of the fiber, thus thoroughly preserving it, without affecting its natural resiliency. The mass emerges from the rear of the reheating machine in a continuous 18-inch flow on to the previously prepared road base, where it is mechanically spread 4 inches thick, steam roller compression immediately reducing it to a compact mass 2 inches thick. The interlocking of the un-uniform preserved sinews of the hard-wood, in conjunction with the substantial penetration of the binding asphalt, in addition to surrounding the particles, is relied upon for durability.

Fibred Asphalt may be laid on any substantial foundation such as old macadam, crushed stone, concrete, old brick, granite or wood blocks or cobble stones. For use on country roads a curb or shoulder is not necessary.

The only patent in connection with Westrumite Asphalt Pavement, exist in the patents for the emulsifying of the native bitumen (not oil residuum) of which it is made, there are also several independent companies within the United States and Canada manufacturing and marketing this product.

Westrumite.—Westrumite Asphalt is adaptable to road uses in three different methods of construction, two of which have one basic principle, the thorough and positive bonding together of mineral aggregate ranging in size from 2 to 1 inch by the introduction of bituminous mortar composed of aggregate varying in size from that which will pass the ½-inch opening to an impalpable dust in proper proportions to assure greatest density, mixed with a proper proportion of Westrumite Asphalt.

Although the principle and the results are practically the same the method of their accomplishment slightly differs.

In the one, on any form of solid and approved base or foundation, such as concrete, crushed stone properly compressed or new or old macadam, the 2 to 1-inch stone is thoroughly coated with the Westrumite Asphalt and spread to a thickness of 2 inches, but in no way is to be compacted allowing the existence of the maximum amount of voids, or air spaces around them. Upon these stones then is spread the mortar as previously described to a depth of 1 inch having a consistency of that of very thick molasses, which, on account of its fluid consistency, largely fills the voids about the 2-inch stone. Such voids that are not thoroughly filled in this manner are filled, when the surface is rolled, with an asphalt roller weighing from 5 to 8 tons until the bituminous materials applied have been thoroughly compacted and left smooth.

Upon this surface is applied a very light coat of Westrumite Asphalt to fill and seal any small voids or interstices that may exist, onto which, before the asphalt becomes set, is spread a thin layer of clean stone chips varying in size from ⅜ to ⅛ inch. The pavement is again thoroughly rolled and in about forty-eight hours, permitting the Westrumite Asphalt to become thoroughly "set," is ready for traffic.

The second method of construction, particularly adaptable to the re-surfacing of new or old macadam roads, is identical to the method described, excepting the 2 to 1-inch stone is not coated with the Westrumite Asphalt. In this method the macadam road to be treated is scarified or harrowed to a depth of 2 to 3 inches, all particles of stone smaller than the ¾-inch thus sifting to the bottom, leaving the coarse stone at the top uncompressed and containing maximum amount of voids. Upon this surface is then spread the bituminous mortar as described in the foregoing with the finish or flush coat handled in the same manner.

The third method of construction consists of a surface treatment of macadam roads.

The road to be treated should be thoroughly cleaned of all small particles, by brooming until the coarse stone is exposed to view, when Westrumite Asphalt is to be applied by use of pouring cans or pressure distributer in proper quantity.

Upon the asphalt thus applied should immediately be spread stone screenings free from clay in varying sizes from ½ inch to impalpable dust in sufficient quantity to "take-up" or absorb the

Westrumite Asphalt. This is then thoroughly rolled until left smooth and compact.

This surface is then covered with a very light application of Westrumite Asphalt into which is spread and rolled a light covering of clean stone chips varying in size from the $\frac{3}{8}$ to $\frac{1}{8}$ inch with the surface again thoroughly rolled. Traffic should be restricted for about forty-eight hours to permit the Westrumite Asphalt to become set.

CONVICT LABOR

The information contained in this chapter comprises the answers to a series of questions submitted to the State authorities in all States in which the law gives authority for using convicts on road work or preparing road material. The questions are as follows:

1. Are convicts actually used for road purposes and if so, how?
2. Approximately how many convicts were so utilized during 1912, or what was the average number at work during the working season?
3. The average cost per man for guarding, feeding, supervision, medical attention, etc.
4. The effectiveness of the convict as compared with the paid labor.
5. The effect of such work upon the health and character of the convict.
6. Approximately the amount of work accomplished by the convicts in 1912. That is, mileage of roads, amount of materials prepared, bridges constructed, etc.

Alabama

1. Convicts are used for road purposes in ten counties of the State. They are used in all the work necessary to building roads.
2. The ten counties in the State are using on an average of about 300 convicts. The number varies as they are sentenced for short terms and with sentences expiring and others beginning, there is a constant change.
3. Cost of convicts varies in the different counties and runs from 40 to 65 cents per day.
4. Convict labor when properly managed by a competent foreman is more effective than paid labor.
5. The convict is in better health and spirits from the outdoor work than he would be either confined in prison or in the mines.
6. We have no record of work done by convicts except those that have been employed on State aid roads.

W. S. Keller,
State Highway Engineer.

Arizona

No convicts were used in building roads during the year, other than repairing roads in the immediate vicinity of the prison.

During the early part of the year the board of control decided to erect a bridge across the Salt River at Tempe, Arizona. A bridge located at this place would serve both the east and west and the north and south highways.

Plans and estimates were made for building with the prison labor a reinforced concrete bridge, of the arch type fifteen hundred feet in length.

In May 1911 a stockade was built at Tempe near the bridge site, and on June 4 twenty-five convicts were transferred from the prison at Florence to the stockade at Tempe, under guard, and work started.

More convicts were brought to the stockade as the work advanced until a force of fifty were at work, this number was maintained the balance of the year. In all seventy-six convicts were transferred to Tempe, of this number two escaped, and one was returned to Florence for insubordination.

The convicts are worked eight hours every day, excepting Sunday, and are guarded at all times.

What is known as double time was granted all convicts at work on the bridge, that means for every day's work the convict is credited with two days off his sentence from the time he left the prison at Florence.

In making estimates, we figure $66\frac{2}{3}$ per cent efficiency for the convict as compared with paid labor, or three convicts will do as much as two paid laborers. One reason for this is that over 50 per cent of the convicts at the bridge camp are Mexicans, most of whom have had little or no experience in bridge building.

With the exception of foreman and some carpenters convicts are used exclusively on this work.

The convicts are better contented at the bridge than in the prison at Florence, and excepting minor ailments, and small injuries, received on the work, there has been no sickness in the camp.

Sinking foundations, screening sand and crushing stone, comprised the work done on the bridge at Tempe during 1911.

Cost.

Guarding, per capita	$0.563
Subsistence, per capita	.478
Medical attention, per capita	.050
Supervision, engineers and foreman, per capita	.420
Total per capita cost	$1.511

J. C. RYAN,
Division Engineer.

California

Mr. A. B. Fletcher, State highway engineer, advises that Warden J. A. Johnston, of Folsom prison reports no convicts on roads, that there is a stone crusher at the prison but the greater portion of the crushed stone is sold to contractors for concrete.

Mr. Fletcher submits the following report from Warden J. E. Hoyle, of San Quentin prison:

1. A small percentage of our prisoners are employed, quite steadily, on road-work building and repairing under the direction of a foreman and two guards.

2. Number of convicts so employed averaged about twenty-five during year 1912.

* * * *

4. From our experience and observation, we believe that convict labor compares very favorably with paid labor.

5. The effect of work of this character on the health and spirits of our prisoners seems excellent.

6. The following is a brief statement of the work accomplished by our road gang during the year:

Work on County Road.

Earth for fill	7214 cu. yds.
Length of fill complete, on road	2770 ft.
Crushed rock for macadamizing	304 cu. yds.
Length of road macadamized	928 ft.
Number of days worked on county road	185
Earth and crushed rock total	7518 cu. yds.
Average crushed rock and earth, per day	40.4 cu. yds.

Colorado

Our largest item of labor performed by the convicts was, of course, the road-work. The prisoners have been employed in the construction of roads in Mesa, Fremont, Larimer, Weld, Boulder, Jefferson, El Paso and Pueblo Counties. They have built 157 miles of good roadway, and a great deal of this has been blasted out of solid rock—that in Mesa County being the most difficult and heaviest work ever attempted by our men.

Owing to the fact that it was impossible to get from the various counties the cost of material, such as cement, lumber, steel, corrugated culverts, powder, tools and supplies, other than actual labor, used in road and bridge building, we are enabled only to give you the labor cost to these different counties for the work of the men. This work has been done at an average cost to the different counties of 32 cents per day per man and as this cost included Sundays and holidays, the cost of the labor of these men to the counties for the two years, or 731 days, would be $36,725.44. We have worked twenty-one State teams, and the feed of these teams cost the counties $20 per month per team, which would amount to $10,080; making a total cost to the counties for labor of $46,805.44. The average labor cost for the 157 miles was $298.12 per mile.

It is hard to estimate the immense value of the roads, for the reason that the work in Mesa County alone would have cost with free labor not less than $25,000 per mile, as the rock in places had to be blasted for 75 feet in order to get a proper road-bed. In this work it was necessary to drill holes 25 feet deep and to drill three depths before the road bed was reached. So you can readily see the magnitude of this work. The work in Ute Pass, in El Paso County, was done through solid rock for 6 miles, all blasting. The work in Salt Canon and Parkdale Hill, in Fremont County, and Pingree Hill, Cherokee Hill and Thompson Canon, in Larimer County, contained a great deal of blasting. This necessarily would have been very expensive work, had it been with free labor, and the counties would have been forced to pay big salaries for drillers, blasters, powder men, masons and cement-workers. Not counting what the contractors profit might be, and not including any skilled labor, except blacksmiths, mason and cement-workers, and estimating the cost of free labor at $2 per day by eliminating Sundays and holidays, we may count 132 men working 610 days at $2 per day, which would give us a labor value of $161,040. We have worked an average of twenty masons and cement-workers, which would have cost the counties $5 per day, and would have amounted to $61,000. We have averaged five blacksmiths, whose labor is estimated at $4 per day, and this would have amounted to $12,220. Estimating the value of twenty-one teams at $2.50 per day per team for 610 days, it would amount to $32,025. At a low figure the value of the labor of these men and teams would be worth to the counties $266,285. Add this to a depreciation of State equipment, $2000, and the interest on State equipment, $2000, and you can see that this labor has been worth to the different counties $270,285. The difference between what the free labor alone would have cost the public—namely, $270,285—and what the labor of our men actually cost them, shows a labor profit of $223,479.56. However, this labor did not compete with the free labor of the State, for the reason that the counties could not otherwise have afforded to do this work.[1]

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[1] Extract from Eighteenth Biennial Report of Commissioners of State Penitentiary, period ending November 30, 1912.

Georgia

We have something like 5000 convicts working on our public roads, which are allotted to the counties according to population to those who desire to work them on the roads. As the wealth of the counties varies greatly the salaries paid wardens and guards also vary. The wealthy counties, of course, employ higher priced men than the poorer ones. The prison commission has nothing whatever to do with the cost of these convicts, as that is borne entirely by the counties handling them. I should judge that the cost of working and maintaining convicts would be less than half it would be for free labor, and as free labor would have to be supervised at very nearly the same cost.

As to the health of the convicts, I think I can safely say that it is 100 per cent better today than it was under the old lease system, as the majority of convicts now live in tents, which we consider more healthful than to be crowded up into stockades.

R. E. Davison,
Prison Commissioner.

Illinois

Replying to your favor of December 17 I beg to submit the following information:

1. No.
2. An average of 66 men employed throughout the year in making road material.
3. This can be answered only by the wardens, and I am writing them requesting them to forward the information to you.
4. It is estimated that in the preparation of crushed stone three convicts are about equal to one paid laborer.
5. The wardens state that the use of the men in the quarries preparing road material is satisfactory on the health of the men, and the moral influence is good.
6. 152,000 cubic yards of crushed stone prepared.

A. N. Johnson,
State Engineer.

The cost per prisoner per day at this institution for past several years has been about 50 cents. There is no difference in cost of caring for the prisoners working in the stone department, than there is in caring for the other prisoners.

James B. Smith,
Warden, Southern Illinois Penitentiary.

Kansas

Warden J. K. Codding, of the State penitentiary, in response to a request from Mr. W. S. Gearhart, State engineer, has submitted a series of letters bearing upon the use of convicts in road work. These letters as well as an extract from Mr. Codding's able and practical address before the Kansas Good Roads Association are given, as follows:

"During 1911 scarcely any convicts were used on public roads. Beginning with July this year I have had from fifteen to thirty at work on the public roads. There was no cost for guards, as we do not put guards over our road camps. One superintendent stayed with the prisoners and directed the work. He received a salary of $66 per month.

As you will see by copy of my address delivered at the Good Roads Association, I believe in putting effective men on the road, as these are prisoners, who have been disciplined and know how to work and obey, and are expecting to become citizens soon, and can do good work. The effect upon the character of the prisoners is the very best.

The cost of feeding prisoners in the institution is 18 cents a day, or 6 cents a meal. In the road camp the cost is increased to approximately 24 cents a day, or 8 cents a meal, which is caused by a greater variety of food furnished, and the increased cost of preparing food for a small number of men as compared to a large number of men. The wear and tear on bedding and cooking utensils used in the tent, of course, brings up the cost of housing to double what it would be to keep the same number of men in the penitentiary.

I believe that the clippings of the extract of my address as set forth in the Topeka *Capitol* will perhaps give Mr. Pennybacker an idea how the conduct of prisoners is improved, as it relates to rural life. I send copy of letter written to me by the schoolteacher, whose school is just across the road from the camp, also copies of letters written by some of the farmers, who live across the road from the camp and work with the road camp men."

Extracts From Letters

"I desire to say a few words to you in regard to the good behavior of the prisoners that have been camping near my place the past three months, working upon the macadam road. They worked as faithfully and honestly, as any bunch of citizens, in fact more so. They conduct themselves gentlemenly and orderly and seem perfectly contented. I have an orchard near the camp and to my knowledge they never went in to take an apple without permission. I consider camping out with select men for road work a success placed under one officer.

R. S. GABLE."

"In regard to the boys' conduct at "Camp Codding," it has been the very best and they have conducted themselves as gentlemen.

They have gotten along among themselves in first class shape.

They have worked as good as men who receive $2 per day. When they first came out on our farm, some of the people in passing looked and thought it was only convicts, but as the boys worked, they began to look at them differently; they think well of them and treat them as citizens.

BENJAMIN G. PIPER."

"I have been informed that you wish a statement from me regarding the good road that is being built South of Lansing; the camp, the conduct of the boys and the impression the camp has made on this neighborhood.

The road is excellent. I don't believe there is a better one being built in the State of its kind; in my estimation if this road is completed as planned it will be a lasting monument to the ones that have put their shoulders to the wheel and kept the proposition rolling. It is something that the country at large will be proud of for years to come.

As for the camp, it is kept in fine condition at all times. The conduct of the boys is above reproach. I have visited the camp a number of times and have invited a great many of the boys to my home and their conduct at all times has been good.

The camp has made a lasting impression on the neighborhood, that is with all the neighbors that I have talked to on the subject, and they want to help a man who is down, back up to full citizenship again.

Yours in favor of kind treatment of convicts when it is deserving and their labor expended on the public roads.

J. L. HEARD."

Extract from Mr. Codding's Address.

"The convicts in the Kansas penitentiary, however, are a small proportion of the human wreckage of this State. For the year ending December 31, 1911, there passed through the county jails of Kansas, 6218 prisoners, one for every 271 of our total State population.

As our jail system is the worst in the world, as we have kept no record of prisoners and have no system whatever in the management of our petty offenders, I found it necessary before I could understand the question of crime and its cure in Kansas to compile statistics for one year of the Kansas jails and lockups. As the expense of this compilation came out of my own pocket I could not afford to do any more than get statistics for the county jails, and have been up to date unable to get any assistance in compiling statistics for city jails.

I think it is fair to assume that as many prisoners passed through the city jails during the period above named as through the county jails. This would give us the grand total of over 12,000 that in one year passed through our jails and lockups in the State.

Of the 81 counties reporting, seven sheriffs say that they have a rock pile and one reports work on county roads and bridges amounting to $200; 54 report no employment; the balance report keeping jail clean, mowing lawn and similar chores.

Consider that 12,000 prisoners passed through the county and city jails last year, and that at least 4000 of them served sentences averaging forty days each. And consider further that this entire body of jail prisoners were in utter idleness, while the prisoners in the Kansas penitentiary costing only 12 cents per day per man to feed them are credited with having turned into the State treasury in coal and brick and money $240,000, and then you get a little idea of the enormous loss that we suffer from our inadequate jail system.

When we realize that this cost in money is but a very little in comparison to the cost in morals, manhood and citizenship—because these same jails, maintained upon a wasteful and extravagant plan are crime breeders, makers of criminals, and destroyers of boyhood and young manhood—we commence to have an idea of what we are doing by maintaining the worst jail systems of the world.

I suggest the following remedy: First, there should be no jail sentence of less than six months. The average ought to be a year and the maximum at least two years. If the offense is so light that only fifteen, twenty or thirty days is required as a deterrent, then the offense is so light that no prisoner should be sent to jail at all, but should be given a sentence of six months in the jail or workhouse and paroled, and remain on parole, unless he violates the terms of it.

The drunkard who beats his wife and insults women and makes a general nuisance of himself ought to be separated from society longer than fifteen days, because a fifteen days' abstinence from liquor simply increases the thirst and fits him for a bigger drink when his fifteen or thirty days are over. No opportunity is given to build up the system by proper food and care in the short time given. Nor has any opportunity been given to teach him habits of cleanliness and industry. His separation from his family and society has not been long enough to work any reformation in his mind or improvement in his body. The back-alley negro who has grown up in idleness and viciousness until he is eighteen or twenty years old is not improved by a thirty-day sentence, nor is the community rid of his presence long enough to pay for the trouble of even convicting him, or the expense of it.

The 12,000 prisoners that passed through the county and city jails last year, if they had been treated as I have suggested herein, would have rendered 720,000 day's service, or about 2000 years; or 2000 men working steadily every day in the year, to the State of Kansas; worth in roads and workhouse buildings and by their use by municipalities in work perfected for the city, so many thousands of dollars.

Allowing one-third of their worth in service to go to their families and two-thirds to the municipality in payment for the expense of their conviction and keep, would have put into the delinquents' homes and into the homes of the very citizens who are breeding criminals, degenerates and delinquents, the necessary means to raise the standard of the living in those homes, at the same time impressing upon the convicted man the value and dignity of labor and the responsibility of a father, a husband and a citizen."

Louisiana

The State Highway Engineer reports that 26⅔ miles of earth road were constructed in 1912 with convict labor, for which the cost was $29,945. He gives the cost of feeding, guarding, etc., at 40 cents per convict per diem. He considers convict labor to be much more satisfactory then free labor, much more economical and very beneficial to the convict.

Michigan

The Michigan law allows the use of State convicts on the highways when proper application is made to the wardens of the various penitentiaries and the request approved by the board of control. The law also allows the use of county prisoners, confined for petty offenses, upon county highways. The law relative to State prisoners was enacted by the legislature of 1911 and up to the present time no county or other organizations has made request for State prisoners. Michigan has never been in accord with the working of State prisoners upon public highways largely for sentimental reasons, and it was only after a long fight that present concessions were granted.

In three counties in Michigan, county prisoners from the county jail have been used upon the highways, either in the building of roads or the crushing of stone for road work. These counties are Oakland, Kalamazoo and Gogebic.

In Oakland County, one of the townships obtained county prisoners from the sheriff to do a grading job, but it was found that the men were such short termed prisoners that the scheme was not very satisfactory.

In Kalamazoo County, one of their road camps is entirely made up of county prisoners, the crew varying from ten to twenty men. It has been found, however, that the camps operated by free labor can construct practically as much road with less friction than can the convict operative camp.

In Gogebic County, county prisoners, in charge of the deputy sheriff, operated the crushing plant and stone quarry under the direction of the county road commissioners. This arrangement proved quite satisfactory, although it was operated on a small scale.

In general, it is the concensus of opinion in Michigan that from the standpoint of constructing roads, the use of prisoners on the highways is not desirable. From the standpoint of the prisoner, we think the work is feasible, in that it gives him vigorous outdoor work, fresh air, etc., which is likely to improve his character more than confinement. In all cases where prisoners have been used upon the roads in Michigan, the men have taken quite kindly to the work.

L. C. Smith,
Office Engineer.

Minnesota

1. About fifteen convicts were used up to and including 1911 in crushing stone on the prison grounds. None employed in 1912.
2. In 1911 about fifteen were employed.
3. Convicts were housed and fed in the Reformatory and we have no record of cost.
4. Under competent supervision we considered them just as effective as free labor.
5. General effect on health and character, good.
6. There were 6500 cubic yards crushed in 1911. No road nor bridge work done in 1912 by convicts.

Geo. W. Cooley,
State Engineer.

Missouri

The law permits any county to work the county jail men on the public roads. Pettis County used a few for a short time, for concrete work. Buchanon County used them for general earth work, ditching, cleaning up the roads, etc., but soon found this to be unsatisfactory and stopped it. Jackson County has used county jail men upon general road work of that county for years at about the same cost as it could be done by contract. Green County has worked her county prisoners with a portable outfit for quarrying and crushing for the past four or five years and found it advantageous.

CURTIS HILL,
State Highway Engineer.

Extract from Letter to Hon. Curtis Hill.

We have been working from 20 to 40 convicts on the roads in Cole County; so far as the work on the roads is concerned it has been satisfactory, the men having done as much if not more work than free labor employed on the same job, and at a cost to the county of a fraction over 46 cents per day per man, just enough to pay for clothing, food and guarding them. It has been very unsatisfactory from a business standpoint, however, and very stringent laws will have to be enacted by the legislature, compelling counties employing prisoners to make prompt settlements.

In the matter of expense the distance from the penitentiary would be a large factor in determining amount required. The outside work has been conducive both to their health and general character.

HENRY ANDRAE,
Warden.

Montana

In answer to question No. 1 will say that we have on the average of 225 convicts working on the road camps. We house them in tents, and run them in crews of 60 to 75 in a crew, and handle each camp with three unarmed guards. They are fed better than the prisoners confined in the prison. I find there are about 33⅓ per cent of the convicts available to work on roads.

2. Our escapes for the year 1912 were six, which I think a very good showing considering the number of men we had outside.

3. The average cost for guarding, feeding, supervision, medical attention, etc., amounted to one dollar per day. One of the heaviest items of expense is transportation.

4. I find that they are much better than free labor—they do more work.

5. The improvement to convicts is 100 per cent.

6. Will say, that the convicts built in the year 1911, 35 miles of road with about one hundred culverts and ten bridges averaging about 16-foot bridges.

FRANK CONLEY,
Warden.

Showing the Amount of material handled at the Prison Road Camp.

5450 feet (1.032 miles) of road completed in Ormsby County, cost to Ormsby County	$363.33
29,157 feet (5.52 miles) of road completed in Washoe County, cost to Washoe County	17,902.00
Cost per mile of road finished in Washoe County	3,243.11

Total number of days worked in Washoe County by prisoners was 7517¼. The work of sixteen men for two days in getting camp ready for occupancy was paid to prisoners, but charged to Washoe County.

Geo. N. Cowing,
Warden.

Nevada

1. Are convicts actually used for road purposes, and if so, how? We have 33 convicts employed on public highways in Washor County, Nevada, 25 miles from the prison. Strictly on the honor system.

2. Approximately how many convicts were so utilized during 1912 or what was the average number at work during the season? Answer, 30.

3. The average cost per man for guarding, feeding, supervision, medical attention, etc. See report.

4. The effectiveness of the convict as compared with paid labor. Undoubtedly more can be accomplished per man by paid labor, for the reason that a lazy or those inclined to get along with doing as little as possible cannot be discharged nor can he quit. You can get just so much work out of them, although a good many are conscientious and give good returns.

5. The effect of such work upon the health and character of the convict? Exceptionally good.

6. Approximately the amount of work accomplished by the convicts in 1912. That is, mileage of roads, amount of materials prepared, bridge construction, etc. See report.

New Jersey

New Jersey is experimenting with convict labor on road work. In December, 1912, we started a gang of sixteen men, two unarmed deputies and one foreman at work and they have been working almost daily since that time.

The work was done near the State prison so that the men could be carried back and forth in a stage, and were fed at noon at a nearby hotel.

I am not able at this time to give any further information concerning the effect of the work on the convicts' health or character, nor the effectiveness of the convict labor as compared with day labor.

EDWARD E. REED,
Division Engineer.

North Carolina

Convicts are sentenced to work on the public roads by the judges of the superior court. These are misdemeanor, as well as long term convicts. During 1912 approximately 2300 convicts have been working on the public roads of North Carolina. These convicts are under the direct supervision and care of the boards of county commissioners, or boards of good road commissioners, of the counties to which the prisoners are sentenced. About twenty-six counties lease their convicts to other counties to be worked on the public roads. The average number worked in the counties per year varied from 6 to 115.

The average cost for guarding, feeding, clothing, and housing, etc., of the convicts varied, as reported by the different counties, from 42 to 72 cents per convict per day. The average cost for the State would be from 55 to 60 cents.

The work of the convicts on the public roads is equal to, and in many instances is more effective, than that of paid labor. Many of the counties report that the work on the public roads improves the health of the convict, and it is undoubtedly true that where the camps are supervised and maintained in a sanitary way, that both the physical and moral effect upon the convict is very good.

Over 50 per cent of the roads built during the past year have been built by using convict labor.

JOSEPH HYDE PRATT,
State Geologist.

Oregon

1. During the year 1912 arrangement was entered into between this office and different county courts by which they were given the use of prisoners from the State penitentiary for use in road construction work. These men were established in camps and were worked without guard, other than the general supervision in their work of an overseer employed by the county. They were paid 25 cents a day by the county and were maintained by the county.

2. The number of convicts so utilized during 1912 varied from 17 to 108.

3. The average cost per man for maintenance was approximately $14 per month. This is based upon the cost of maintenance at the penitentiary as this office has not been furnished with statements covering this by counties.

4. It has been found that these men are fully as effective as free labor. Experience has shown them to work faithfully and diligently.

5. The effect of such work upon the health and character of the convict is most salutary. Such work puts the men in good physical condition and makes him cheerful and hopeful, which is conducive to his better conduct and more certain reformation.

6. I have not been advised as yet by the different counties of the probable amount of work done.

OSWALD WEST.

Texas

The offers of Governor Colquitt to lease convicts to the counties were all refused, and no convicts are being used on the roads in Texas, except misdemeanor convicts held by the various counties.

ROBET J. POTTS,
Division Engineer.

Virginia

The State highway commissioner of Virginia reported for the 1912 GOOD ROADS YEAR BOOK that convicts were used with very great satisfaction in road construction, the average number per day was 735, the average cost per man for guarding, feeding and clothing was 34.3 cents per calendar day or 50.48 cents per ten hour working day. He considered the convict to be worth at least 80 per cent of the best free labor, and that the effect of this employment on the health and character of the convict was exceedingly beneficial. This statement of the convict labor situation represents the situation at present except that legislation has been enacted permitting a larger number of convicts to be used (see "Road Legislation").

Washington

Extract from letter to Paul D. Sargent, February 7, 1913.

Average number of convicts per day employed on road construction, none.

Average number convicts per day, employed in state quarries, 66.

The value of these convicts to the State can be shown in the following two ways: (1) Profit per man per day on operation. (2) The saving per man per day resulting from the use of convict labor as compared to the cost of free labor.

The following amplification is based on an average month.

(1)	Received from sale of 3500 yards of rock at 70 cents	$2450.00
	Cost of operation	1500.00
	Profit	$ 950.00
	Number of convicts constituting full crew	35
	Profit per convict per month	$27.14
	Profit per convict per day	1.04
(2)	Cost of free labor per man per day prevailing in this State during 1912	$2.50
	Cost of convict labor per man per day	.70
	Saving per man per day	$1.80

Basis on which a Cost of 70 cents per Convict per day is Figured.

Salaries of three guards at $60 plus $10 for board	$210.00
Subsistence at an average of 25 cents per day per convict for 30 days per month	306.25
Clothing and shoes at $1.25 per month per convict	43.75
Medical treatment at 50 cents per month per convict	17.50
Recapture of escapes at 50 cents per month per convict	17.50
Transportation of convicts $1.00 per month per convict	35.00
	$630.00
Average cost per convict per month	$18.00
Average cost per convict per day	.70

PHILIP E. ROBBINS,
Superintendent of Quarries.

Convict Labor Publications

Appian ways of the South, *Sportsman and Motorist*, February, 1912.

Convict labor on State Roads, *Engineering Record*, February 10, 1912.

Convict-built gravel roads, *Engineering Record*, February 24, 1912.

Convict road labor in Colorado, *Engineering Record*, December 16, 1912.

To adopt convict system of road making, Dalton, Ga., *Municipal Journal and Engineer*, September 20, 1911.

Convict labor and good roads, *The Contractor*, October 1, 1911.

Convict labor for Adirondack roads, *American Motorist*, February, 1912.

Convicts and the public roads, *Southern Good Roads*, February, 1912.

Convict labor on road work, *Public Officials*, September, 1910.

Convict labor, *Michigan Roads and Forest*, July, 1911.

Convict labor on standard pavement, Col. C. L. Anderson, *Public Officials*, October, 1910.

Convict labor on roads, Charles T. Lassiter, *Better Roads*, February, 1912.

Convict road labor, in Colorado, *Engineering Record*, December 16, 1911.

How to mould public opinion, Albert J. Galen, Attorney General of Montana, *Good Roads Magazine*, August 5, 1911.

Is convict labor on roads in northern States economic? *Engineering Contracting*, January 18, 1911.

National Committee on Prison Labor, *Prison Labor Leaflets*, Nos. 1-5.

Orangeburg convicts built many roads, Columbia, S. C., Supervisor F. J. D. Felder, *Municipal Journal and Engineer*, December 28, 1911.

Reports of State highway departments.

Reference to convict built roads in Kalamazoo County, Mich., *Engineering Record*, February 24, 1912.

Rock crushing by convict labor in Washington, *Engineering & Contracting*, February 5, 1913.

Report of the U. S. Commissioner of Labor, 1905.

Road-making convicts, paper by Dr. E. Stagg Whitin before Good Roads Congress at Birmingham, Ala., *Engineering Record*, June 17, 1911.

Road building by convict labor in Davidson County, Tenn., W. G. M. Campbell, *Good Roads*, January 6, 1912.

Road building by convict labor in Colorado, Thomas J. Tynan, Warden Colorado Penitentiary, *Good Roads*, November 4, 1911.

Twentieth annual report of the United States commission of labor, 1905.

Use of convicts on the public roads of Georgia, S. W. McCallie, *Engineering Record*, August 5, 1911.

STATE AID APPROPRIATIONS AND EXPENDITURES

Alabama

Total expenditures for State aid roads, from March 1, 1911, to January 1, 1912 (year ending March 1, 1912), $25,332.64.

"There will be available for State aid work from the State $264,000 for the year 1913. This includes $130,000 left over from 1911 and 1912. The counties are required to meet this appropriation in order to obtain aid."

W. S. Keller,
State Highway Engineer.

Arizona

Law changed, 1912, so that State tax is levied to produce State road tax fund of $250,000 annually.

California

Total expenditures for trunk line roads, up to January 1, 1912, $403,300; appropriations for fiscal years, July 1, 1911, to June 30, 1913, $135,000, not including $18,000,000 bond issue for trunk lines which is now being expended.

Colorado

Total expenditures for State aid and trunk line roads to December 31, 1911, $1,050,000.

"Owing to legal difficulties our road funds are tied up. There is now in our State treasury about $500,000 to be used for road work" (extract from report of C. P. Allen, chairman, in 1912 Year Book).

"We now have in our State treasury about $750,000, and this amount will be increased to nearly a million dollars by the end of 1913. These funds have been tied up for the past two years owing to legal difficulties. Our State legislature at this time has bills before them which will undoubtedly turn this fund over to the state highway commission."

C. P. Allen,
Chairman, State Highway Commission.

Connecticut

Total expenditures for State aid roads up to December 31, 1911, \$3,700,572.29, total expenditures for trunk line roads up to December 31, 1911, \$2,500,000, total expenditures for both State aid and trunk line roads up to December 31, 1911, \$6,200,572.29. Appropriation for State aid roads for the biennial period from September 30, 1911, to September 30, 1913, \$1,000,000, appropriation for trunk line roads for the same period, \$2,000,000, appropriation for both State aid and trunk line roads for the biennial period from September 30, 1911, to September 30, 1913, \$3,000,000. In addition to above, there is \$200,000 for repairs and \$202,000 for administrative expenses during the same period, and about \$250,000 annually from automobile licenses. The State pays three-quarters of the cost of State aid roads in towns with a grand list of over \$1,250,000 and $\frac{7}{8}$ per cent of the cost in towns having a grand list of the said amount or less.

Delaware

"As far as Kent County is concerned, I understand that they have not issued any of the \$100,000 bonds authorized for road improvement. The \$200,000 issue by New Castle County is the third bond issue that we have had. The first, for \$300,000, was authorized in 1907; the second, for \$300,000, was authorized in 1909, and the last, for \$200,000, was authorized in 1911, making a total of \$800,000. The first and second issues have all been spent and all the bonds of the third issue have been sold.

"The county will have available for building roads this year, the \$10,000 from the State, \$37,810.62 remaining from the third bond issue, making a total of \$47,810.62.

"In addition to this there will be some money appropriated out of the general county funds for road building and probably about \$40,000 for road maintenance.

"There may be another bond issue authorized by the General Assembly of the state, which is now in session."

FRANCIS A. PRICE,
(former) New Castle County State
Highway Commissioner.

Georgia

Total expenditures for State convict aid roads up to December 31, 1911, \$4,233,800; cost of State aid roads for 1912, \$1,543,800. In both of the aforementioned amounts is included the estimated value of convict labor, on the basis of \$1 per day for 300 days for each convict.

Idaho

Total expenditures for State aid roads up to December 31, 1911, $53,000, total appropriation for State aid roads for the year 1912, $193,000. There is included in this amount of $193,000 the various State bond issues by the 1911 legislature for the biennial period 1911-1913. The cost of State aid roads is apportioned 65.2 per cent to the State and 34.8 per cent to the county.

"Information not available until March 6 at the close of the legislature."

A. E. Robinson,
State Engineer.

Illinois

Total expenditures for State aid roads up to December 31, 1911 $330,000, total appropriation for the year 1912, for State highway department, $100,000 (the State furnishes crushed stone, machinery and engineering supervision).

"The funds available for 1913 will depend on the action of the legislature which is now in session. It is expected that bills will be introduced which will call for an appropriation for State aid roads. While the outcome of such a measure can not now be foreseen, it can be said that there has never been before such strong public sentiment for such a measure.

"It has been proposed that there should be available for State road work an income of the State derived from the Illinois Central Railroad, an income from the inheritance tax, and also an income received from the automobile licenses. This would yield upwards of $2,000,000 annually."

A. N. Johnson,
State Engineer.

Iowa

Estimated amount of money available for road improvement during 1913 including culverts and bridges

State appropriation for highway commission	$ 10,000.00[1]
Auto tax distributed by the State	500,000.00
Township road fund controlled by township trustees	2,500,000.00
Township drag fund controlled by township trustees	500,000.00
County road fund controlled by county supervisor	1,000,000.00
County bridge fund controlled by the county supervisors	3,500,000.00

The above are all cash taxes. There is in addition roughly $500,000 available from labor taxes.

Thos. H. MacDonald,
Highway Engineer.

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[1] Probably will be increased this winter.

Kansas

"The funds available for road and bridge purposes from the townships and counties during the year 1912 were about $4,975,000 and for the year 1913 they will be about $5,250,000. We have not been able to get all of this data compiled accurately but this is approximately correct and we have reports from all of the counties in the State. About $7000 will be available for this department for the year ending July 1, 1913."

W. S. GEARHART,
State Engineer.

Kentucky

Total appropriation for State highway department for the year 1912, $25,000.

Louisiana

Total expenditures for State aid roads up to December 31, 1911, $129,594.16, appropriation for State aid for the year 1912, $130,000. These amounts are supplemented by labor of State convicts, surplus revenues of the oyster commission and the fish and game commission and automobile revenues. The cost of State aid roads is apportioned 20 to 50 per cent to the State and 50 to 80 per cent to the county.

"Estimated parish expenditures for 1912 $1,131,322.15; estimated expenditures by incorporated places $1,015,740.41; state highway department contracts let during 1912, $131,694.25; State convict camps 1912, $32,220; total, $2,310,976.81."

C. C. SANDOZ,
Secretary, State Board of Engineers.

Maine

Total expenditures for State aid and trunk line roads up to December 31, 1911, $952,209.75. Total appropriation for State aid and trunk line roads for the year 1912, $250,000. The trunk line road fund consists of the portion of the State aid appropriation not applied for by the towns. The cost of State aid and trunk line work is apportioned two-thirds to three-sevenths to the State and one-third to four-sevenths to the township.

"Funds available for the State for the year 1913 State road work:

Net unexpended balance from previous years	$136,003.87
Appropriation for 1913	250,000.00
Estimated automobile licenses	110,000.00
Total	$496,003.87

"Legislation is now pending before the legislature relative to a bond issue of $2,000,000 so I am giving you what our appropriation would be under our present law ($250,000)."

P. L. Hardison,
Commissioner.

Maryland

Total expenditures for State aid roads up to December 31, 1911, $2,211,000. Appropriation for State aid roads for the year 1912, $200,000. Total expenditure for trunk line roads up to December 31, 1911, $5,000,000. Appropriation for trunk line roads for the year 1912, $2,350,000. The cost of State aid roads is apportioned 50 per cent to the State and 50 per cent to the county. Trunk lines are paid for by the State.

"Would say that $2,250,000 worth of State bonds were issued in the year 1912 for State road work in Maryland. We have available for the year 1913, $2,170,000. In addition to these funds, in each of the years mentioned, there has been available for State aid work the annual appropriation of $300,000 and for the Baltimore-Washington road work $100,000 was appropriated for the year 1912."

H. G. Shirley,
Chief Engineer.

Massachusetts

Total expenditures for State aid roads up to December 31, 1911, $8,494,942.70. Appropriation for State aid roads for the year, 1912, $716,000 (this includes $200,000 for maintenance and is supplemented by automobile licenses amounting to about $300,000 net). The cost of State aid work is apportioned 75 per cent to the State and 25 per cent to the county.

"The amount of State money available for road work in Massachusetts in 1913, is as follows: For State highway construction, $925,000. For "small town" work, so-called, $150,000. This money is allotted as follows: (a) $50,000 is distributed in towns of over a million dollars valuation, and each town to which any money is allotted is required to allot a sum equal to that allotted by the commission. (b) $50,000 is distributed to towns with a valuation under a million dollars, under the same conditions. (c) $50,000 is distributed to towns under a million dollars valuation, which towns are not required to contribute any money.

"The above State appropriation, namely, $1,075,000 is provided for by thirty-year bonds.

"For the maintenance of State highways, $250,000 is available, this being a regular appropriation made by the State, the money being derived from annual revenue. In addition to this amount for maintenance, it is estimated that there will be approximately $400,000 available from motor vehicle fees, for the resurfacing and maintenance of State highways, and $100,000 for improving and maintaining town roads. This last sum, although expended on town roads, is expended entirely under the direction of the commission."

A. W. Dean,
Chief Engineer.

Michigan

Total expenditures for State aid roads up to June 30, 1912, $910,000. Appropriation for State aid roads for the fiscal year ending June 30, 1913, $250,000. The State contributes to the cost of State aid work according to the type of the road, ranging from $250 to $1000 per mile.

Minnesota

The total expenditures for the maintenance of the State highway department from May 1, 1911, to December 31, 1912, were $195,262.89; the total expenditures for State aid to December 31, 1911, were $360,024; the total expenditures for State aid during the calendar year 1912 were $266,404.41, making the total expenditures for State aid to December 31, 1912, $626,428.41, and including maintenance of State highway department $821,691.30. To this should be added $48,000 estimated yet to be paid on 1912 State aid roads, making the total State aid payments for 1912 $314,404, and the total expenditure to December 31, 1912, $869,691.30. The State levies a $\frac{1}{4}$ mill tax for State aid to road improvement, which will yield about $350,000 for 1913.

"I have to advise that the State Auditor has notified me that the following amounts will be available:

State road and bridge fund	$350,000.00
County road and bridge fund	1,514,931.57
Township road and bridge fund	1,530,175.31

"This does not include statute labor tax nor delinquent taxes."

Geo. W. Cooley,
State Engineer.

Missouri

"We cannot tell the amount of money that will be available for road work for 1913, but I think we will have about $200,000. This money is derived from the automobile licenses, and is apportioned to the counties on July 1 each year. The apportionment is based on the assessed valuation of the counties. We apportioned $100,000 last year.

"We have another road fund known as the 'good roads fund stamp act.' This money is derived from the sale of option stamps by the State auditor. We have $104,000 on hand at this time, and this fund is increased at the rate of about $2500 per month. This money will be apportioned to the counties each year. This apportionment is based on the school enumeration of each county."

John P. Gordon,
State Auditor.

Nebraska

A State tax of ⅕ mill is levied to create a "State aid bridge fund."

Nevada

Total expenditures for State aid up to December 31, 1911, $20,000. Appropriation for State aid for the year 1912, $20,000. This amount is a "general road fund" for the maintenance of convict labor.

New Hampshire

Total expenditures for State aid up to December 31, 1911, $1,265,483.98. Appropriation for trunk lines was $310,000 for construction and $75,000 for maintenance for the year 1912, and for construction of non-trunk lines $68,000. The cost of State aid apportioned to the State varies from 20 cents to $3 for each $1 locally raised. Trunk lines are paid for by the State.

New Jersey

Total expenditures for State aid roads up to December 31, 1911, $3,895,000. Total expenditures for trunk line roads (for surveys and maps) up to December 31, 1911, $10,000. Appropriation for State aid (including $350,000 for maintenance from the "motor vehicle fund") for the year 1912, $750,000. Appropriation for trunk line roads (for surveys and maps) for the year 1912, $10,000. The cost of State aid is apportioned 40 per cent to the State, 50 per cent to the county and 10 per cent to the township.

"The appropriation available for roads during 1913 is $300,000. The legislature has heretofore usually made a further appropriation of $100,000 in the supplementary appropriation bill but this amount has not yet been appropriated and is therefore not available.

"The motor vehicle fund available for repairs is now estimated at $550,000."

E. A. Stevens,
Commissioner.

New Mexico

Total expenditures for State aid and trunk line roads up to March, 1912, $162,055.50 Appropriation for State aid and trunk line roads for the year ending March, 1912, $37,820.21, which is raised by a State tax of 1 mill on the dollar. The cost of State aid roads is paid for either wholly or in part by the State.

"At the beginning of this year there is approximately $25,000 on deposit for the construction of roads by the State highway commission. During the coming year the mill levy, which is given the highway commission, will probably amount to approximately $70,000. There is also available about $10,000 from the automobile tax. On July 1 there will be $500,000 available from a State bond issue and there is also an income from the back taxes throughout the State preceding 1911, which may bring $10,000 to $20,000 for the next few years.

"Some of the counties under the last legislature are allowed to issue bonds to within 4 per cent of their assessed valuation, and already two counties have definite plans for bond issues and in two cases one county voted and passed almost unanimously $100,000 bond issue. Some technicality in the law may cause this issue to be voted on again. Another county voted $30,000 recently, and is up against the same thing through a technicality, and will be taken up immediately by election."

James A. French,
State Engineer.

New York

Total expenditures by State to December 31, 1911, for State highways and State aid highways, $55,121,826.14. Amount available for the year 1912, $23,000,000. The cost of State aid roads is apportioned 50 to 88 per cent to the State, 8 to 35 per cent to the county and 1 to 15 per cent to the township. State highways are constructed and maintained at expense of the State.

Appropriation for 1913 not yet made but will probably be about $10,000,000.

North Carolina

Total expenditures for road department of geological survey to December 31, 1911, $13,750. Appropriation for the year 1912, $5000. Amount will probably be increased for 1913.

North Dakota

In 1909 a good roads experiment station was established at Bismarck. Convict labor was to be used near the prison but no appropriation was made.

Ohio

Total expenditures for State aid up to December 31, 1911, $2,015,952.19. Appropriation for State aid for the year 1912, $660,000. The cost of State aid work is apportioned 50 per cent to the State, 25 per cent to the county, 15 per cent to the township and the remaining 10 per cent is paid by abutting property owners.

Oklahoma

There is a fund of $5000 derived from automobile licenses applied to maintenance of State highway department.

Pennsylvania

Total expenditures for State aid up to December 31, 1911, $9,500,000. Total expenditures for trunk lines up to December 31, 1911, $3,000,000. Appropriation for State aid for the year 1912, $1,000,000. Appropriation for trunk lines for the year 1912, $3,000,000. The cost of State aid is apportioned 50 per cent to the State, 25 per cent to the county and 25 per cent to the township. Trunk lines paid for by the State.

Rhode Island

Total expenditures for trunk lines up to December 31, 1911, $1,913,933.79. Appropriation for trunk lines for the year 1912, $940,000. The State pays all of the cost of trunk line roads.

"We expect to get an appropriation for maintenance of $200,000 and from automobile law surely $100,000." (1913.)

Peter J. Lannon,
Clerk.

South Dakota

There is no specific appropriation for State aid.

"Basing an estimate of the amount of cash revenue available for public roads in South Dakota for 1913 upon the figures for 1912, as given in the State auditor's report, and in other reports, it is estimated that the county road and bridge fund for South Dakota during 1913 will be approximately $1,000,000; the amount available for township and local road expenditure is about $250,000, making a total of about $1,250,000 to be expended on public roads and bridges in South Dakota during 1913."

Samuel H. Lea,
State Engineer.

Utah

Total expenditures for State aid up to December 31, 1911, $203,000. Appropriation for State aid for the year 1912, $240,000. The cost of State aid is apportioned 80 to 50 per cent to the State and 20 to 50 per cent to the county.

Vermont

Total expenditures for State aid up to December 31, 1911, $1,812,962.80. Appropriation for State aid for the year 1912, $350,000. The cost of State aid is apportioned 50 per cent to the State and 50 per cent to the township.

Virginia

Total expenditures for State aid up to December 31, 1911, $996,245.80. Appropriation for State aid for the year 1912, $310,000. The cost of State aid work is apportioned 50 per cent to the State and 50 per cent to the county. This does not include convict labor which is supplied by State.

Washington

Total expenditures for State aid up to December 31, 1911, $1,359,117. Total expenditures for trunk lines up to December 31, 1911 (exclusive of the cost and transportation of stone) $902,662.65. Amount available for State highways and permanent highways for the year 1912, $1,093,400.

"The amount available (1913) will depend entirely upon the the appropriations made by the legislature which is now in session, but the sums already provided by taxation are from two funds—½ mill levy, yielding $500,000 for State roads and bridges, and a 1 mill levy, yielding $1,000,000 for so-called "permanent highways. Total, $1,500,000."

W. J. Roberts,
Highway Commissioner.

Wisconsin

Total appropriation for State aid for the year 1912, $250,000. The cost of State aid roads is apportioned one-third to the State, one-third to the county and one-third to the township. The State also pays one-fifth of the cost of State aid bridges.

Wyoming

Total expenditures for State aid up to December 31, 1911, $10,000.

MILEAGE OF ROADS

Alabama

Total mileage of public roads, 49,639, according to Bulletin No. 41, U. S. Office of Public Roads; total mileage of improved roads, 3786 (of which 16 miles were completed under State aid, year ending March 1, 1912); percentage of roads improved 7.6 per cent.

Arizona

Total mileage of public roads, 5987; total mileage of improved roads, 273; percentage of improved roads, 4.5 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Arkansas

Total mileage of public roads, 36,445; total mileage of improved roads, 1085; percentage of improved roads, 2.9 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

California

Total mileage of public roads, 48,069; total mileage of improved roads, 8575; percentage of improved roads, 17.8 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 8588 miles of improved roads.

Colorado

Total mileage of public roads, 29,693; total mileage of improved roads, 320.5; percentage of improved roads, 1.1 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics show 422 miles of improved roads (of which 101 miles have been completed under State aid up to December 31, 1911), or a percentage of improved roads of 1.4 per cent.

Connecticut

Total mileage of public roads, 12,583; total mileage of improved roads, 3030.54; percentage of roads improved, 24.08 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 3100 miles of improved roads (of which 973.22 miles have been completed under State aid up to December 31, 1910), the percentage of improved roads being 24.5 per cent.

Delaware

Total mileage of public roads, 3000; total mileage of improved roads, 186.44; percentage of roads improved, 6.22 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 197 miles of improved roads (of which 110 miles have been completed under State aid up to December 31, 1910), the percentage of roads improved being 6.5 per cent.

Florida

Total mileage of public roads, 17,579; total mileage of improved roads, 1752.35; percentage of improved roads, 9.97 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 17,954 miles of public roads, 2175 miles of improved roads, making a percentage of improved roads of 12.1 per cent.

Georgia

Total mileage of public roads, 82,230; total mileage of improved roads, 5978; percentage of improved roads, 7.27 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 83,986 miles of public roads, 22,043 miles of improved roads, making a percentage of improved roads 26.2 per cent.

Idaho

Total mileage of public roads, 18,403; total mileage of improved roads, 510.5; percentage of roads improved, 2.77 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Illinois

Total mileage of public roads, 94,141, according to Bulletin No. 41, U. S. Office of Public Roads; total mileage of improved roads, 8914 (of which 115.5 miles of experimental roads have been completed up to December 31, 1911), the percentage of improved roads being 9.47 per cent.

Indiana

Total mileage of public roads, 67,996; total mileage of improved roads, 24,955.75; percentage of roads improved, 36.7 per cent. This is according to Bulletin No. 41, U. S. Office Public Roads.

Iowa

Total mileage of public roads, 102,427, total mileage of improved roads, 2505.1; percentage of roads improved, 2.45 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Kansas

Total mileage of public roads, 98,302, total mileage of improved roads, 374.71; percentage of roads improved, 0.38 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Kentucky

Total mileage of public roads, 53,744; total mileage of improved roads, 10,114.95; percentage of roads improved, 18.82 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Louisiana

Total mileage of public roads, 24,962, according to Bulletin No. 41, U. S. Office of Public Roads; total mileage of improved roads, 329.5 (of which 133 miles have been completed under State aid up to December 31, 1911); percentage of roads improved, 1.32 per cent.

Maine

Total mileage of public roads, 25,528; total mileage of improved roads, 2703.06; percentage of roads improved, 10.59 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give the mileage of improved roads as 2927 (of which 766 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved 11.4 per cent.

Maryland

Total mileage of public roads, 16,773; total mileage of improved roads, 2142.3; percentage of roads improved, 12.77 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 16,400 miles of public roads, 2156 miles of improved roads (of which 154.34 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 14.1 per cent.

Massachusetts

Total mileage of public roads, 17,272; total mileage of improved roads, 8463.18; percentage of roads improved, 49 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 8674 miles of improved roads (of which 1145.49 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 56.8 per cent.

Michigan

Total mileage of public roads, 68,906; total mileage of improved roads, 6900.54; percentage of roads improved, 10.01 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Revised statistics give 7587 miles of improved roads (of which 1233 miles have beeen completed under State aid up to June 30, 1912), making a percentage of roads improved of 11 per cent.

Minnesota

Total mileage of public roads, 79,323; total mileage of improved roads, 5416.85; percentage of roads improved, 6.83 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 6206 miles of improved roads (of which 1279 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 9.4 per cent.

Mississippi

Total mileage of public roads, 39,619; total mileage of improved roads, 342.25; percentage of roads improved, 0.86 per cent. This is according to Bulletin No. 41 U. S. Office of Public Roads. Revised statistics give 44,072 miles of public roads, 345 miles of improved roads, making a percentage of roads improved of 0.78 per cent.

Missouri

Total mileage of public roads, 107,923; total mileage of improved roads, 4755.5; percentage of roads improved, 4.4 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Montana

Total mileage of public roads, 23,319; total mileage of improved roads, 95; percentage of roads improved, 0.41 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Nebraska

Total mileage of public roads, 80,338; total mileage of improved roads, 248.55; percentage of roads improved, 0.3 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Nevada

Total mileage of public roads, 12,751; total mileage of improved roads, 46; percentage of roads improved, 0.36 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 62 miles of improved roads (of which 16 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 0.4 per cent.

New Hampshire

Total mileage of public roads, 15,116; total mileage of improved roads, 1448.48; percentage of roads improved, 9.58 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Revised statistics give 1745 miles of improved roads (of which 765.7 miles have been completed under State aid and trunk lines up to December 31, 1910), making a percentage of roads improved of 11.5 per cent.

New Jersey

Total mileage of public roads, 14,842; total mileage of improved roads, 3377.86; percentage of roads improved, 22.76 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 3507 miles of improved roads (of which 1578 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 23.6 per cent.

New Mexico

Total mileage of public roads, 16,920; total mileage of improved roads, 104; percentage of roads improved, 0.16 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 574 miles of improved roads, making a percentage of roads improved of 3.3 per cent.

New York

Total mileage of public roads, 79,279; total mileage of improved roads, 12,787.36; percentage of roads improved, 16.13 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 15,592 miles of improved roads (of which 3364 miles have been completed under State aid up to December 31, 1912), making a percentage of roads improved of 17.4 per cent.

North Carolina

Total mileage of public roads, 48,285; total mileage of improved roads, 2313; percentage of roads improved, 4.79 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 3440 miles of improved roads, making a percentage of roads improved of 7.1 per cent.

North Dakota

Total mileage of public roads, 61,593; total mileage of improved roads, 140; percentage of roads improved, 0.23 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 161 miles of improved roads, making a percentage of roads improved of 0.26 per cent.

Ohio

Total mileage of public roads, 88,861; total mileage of improved roads, 24,106; percentage of roads improved, 27.13 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Revised statistics give 24,215 miles of improved roads (of which 168 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 27.2 per cent.

Oklahoma

Total mileage of public roads, 71,325; total mileage of improved roads, 361; percentage of roads improved, 0.5 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Oregon

Total mileage of public roads, 29,475; total mileage of improved roads, 2799.25; percentage of roads improved, 9.49 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Pennsylvania

Total mileage of public roads, 87,386.79; total mileage of improved roads, 3364.76; percentage of roads improved, 3.84 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 3472 miles of improved roads (of which 836 miles have been completed under State aid up to December 31, 1911, "reported by chief clerk, State highway commission"), making a percentage of roads improved of 3.97 per cent.

Rhode Island

Total mileage of public roads, 2120.75; total mileage of improved roads, 1042.07; percentage of roads improved, 49.14 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 1077 miles of improved roads (of which 251 miles of trunk line roads have been completed up to December 31, 1911), making a percentage of roads improved of 50.7 per cent.

South Carolina

Total mileage of public roads, 32,075; total mileage of improved roads, 3534.75; percentage of roads improved, 11.02 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. The eighth annual report of the commissioner of agriculture gives the total mileage of public roads as 47,885; the total mileage of improved roads as 5128; which makes the percentage of roads improved 10.7 per cent.

South Dakota

Total mileage of public roads, 56,354; total mileage of improved roads, 286; percentage of roads improved, 0.5 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Tennessee

Total mileage of public roads, 45,913; total mileage of improved roads, 5353.5; percentage of roads improved, 11.66 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Texas

Total mileage of public roads, 128,971; total mileage of improved roads, 4896; percentage of roads improved, 3.8 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Utah

Total mileage of public roads, 8320; total mileage of improved roads, 1018; percentage of roads improved, 12.23 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 1143 miles of improved roads (of which 125 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 13.7 per cent.

Vermont

Total mileage of public roads, 14,406; total mileage of improved roads, 2650.63; percentage of roads improved, 18.4 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 2678 miles of improved roads (of which 1031 miles have been completed under State aid up to December 31, 1911, not including cities or incorporated villages, special agent report of January 1, 1913), making a percentage of roads improved of 18.58 per cent.

Virginia

Total mileage of public roads, 43,399; total mileage of improved roads, 1902.75; percentage of roads improved, 4.38 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 2589 miles of improved roads (of which 852 miles have been completed under State aid up to December 31, 1911), making a percentage of roads improved of 5.9 per cent.

Washington

Total mileage of public roads, 34,283.6; total mileage of improved roads, 4520.68; percentage of roads improved, 13.19 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads. Revised statistics give 12,263 miles of improved roads (of which, according to the fourth biennial report of the State highway commissioner for the period ending September 30, 1912, there had been completed under State aid work 145.76 miles and under State work about 200 miles), making a percentage of roads improved of 31.7 per cent.

West Virginia

Total mileage of public roads, 32,109; total mileage of improved roads, 591.4; percentage of roads improved, 1.8 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Wisconsin

Total mileage of public roads, 61,090; total mileage of improved roads, 10,167.33; percentage of roads improved, 16.64 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Wyoming

Total mileage of public roads, 10,569; total mileage of improved roads, 416; percentage of roads improved, 3.94 per cent. This is according to Bulletin No. 41, U. S. Office of Public Roads.

Summary

Bulletin No. 41, U. S. Office of Public Roads, gives the total mileage of public roads in the United States as 2,199,645.14 and the total mileage of improved roads as 190,476.32, making the percentage of roads improved 8.66 per cent. Revised statistics, December 31, 1911, places the total mileage of public roads at 2,222,248.14, and the total mileage of improved roads at 224,485.07, which makes the total percentage of roads improved 10.1 per cent. This is an increase of 22,603 miles of public roads and 34,008.75 miles of improved roads, with an increase in the percentage of roads improved from 8.66 per cent to 10.1 per cent, or a net increase of 1.44 per cent.

ROAD AND BRIDGE BONDS[1]

STATE BONDS AUTHORIZED

California	$18,000,000.00	
Connecticut	4,500,000.00	
Idaho	193,000.00	
Maine	2,000,000.00	
Maryland	6,000,000.00	
Massachusetts	2,500,000.00	
New Hampshire	1,000,000.00	
New Mexico	500,000.00	
New York	100,000,000.00	
Rhode Island	1,800,000,00	
Utah	260,000.00	
Washington	125,000.00	
		$136,878,000.00

COUNTY AND TOWNSHIP ROAD AND BRIDGE BONDS OUTSTANDING, DECEMBER 31, 1912[2]

Alabama

Autauga	$55,000.00
Bullock	160,000.00
Colbert	200,000.00
Conecuh	100,000.00
Dallas	410,000.00
Escambia	38,000.00
Jackson	250,000.00
Jefferson	200,000.00
Lawrence	123,000.00
Limestone	35,000.00
Mobile	150,000.00
Montgomery	850,000.00
Morgan	260,000.00
Perry	126,000.00
Russell	100,000.00
St. Clair	80,000.00
Sumter	120,000.00
Walker	30,000.00

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[1] The information contained in the chapter relating to road and bridge bonds was obtained from the United States Office of Public Roads, the State highway departments and by direct correspondence with local officials. In this way reports have been obtained from between 75 per cent and 80 per cent of the counties in the United States.

[2] Where reports to December 31, 1912, are not available the reports to December 31, 1911, are shown in a group immediately following the 1912 reports and separated from them by a space so as to avoid confusion.

1911

Coffee		$111,000.00	
Elmore		170,000.00	
Pike, road district		192,000.00	
			$3,760,000.00

Arizona

Greenlee		$16,000.00	
Maricopa, road district no. 1	$30,000		
Maricopa, road district no. 2	30,000	60,000.00	
			$76,000.00

Arkansas

Jefferson, road improvement district		45,500.00	
Lee, road improvement district		99,000.00	
Sebastian, (Ft. Smith and Van Buren)		600,000.00	
1911			
St. Francis		22,000.00	
			$766,500.00

California

Glenn, road	$160,000		
Glenn, bridge	290,000		
		$450,000.00	
Lake		20,000.00	
Los Angeles		3,500,000.00	
Orange, bridge	$100,000		
Orange, highway	1,270,000		
		1,370,000.00	
Plumas		100,000.00	
Sacramento		825,000.00	
San Benito		300,000.00	
San Diego		1,188,000.00	
" " road improvement district		15,162.00	
San Joaquin		1,850,000.00	
San Mateo		3,000.00	
Santa Barbara, permanent road divisions		130,000.00	
Ventura		270,000.00	
			$10,021,162.00

Colorado

Garfield		$14,000.00	
La Plata		38,000.00	
San Miguel		35,000.00	
			$87,000.00

Connecticut

Fairfield, Stamford, school and bridge		$96,000.00	
1911			
Fairfield, Easton	$25,000		
Fairfield, New Canaan	14,000		
Fairfield, Wilton	35,000		
		74,000.00	

Hartford	Manchester	$125,000		
	Plainville	20,000		
	West Hartford	45,000		
	Windsor	40,000	$230,000.00	
Litchfield	Barkhamsted	$16,000		
	North Canaan	23,000	39,000.00	
Middlesex	Chatham	$70,000		
	East Haddam	44,000	114,000.00	
New Haven, Derby			60,500.00	
New London, Montville			30,000.00	
Windham	Brooklyn	$28,000		
	Killingly	125,000		
	Plainfield	30,000	183,000.00	
				$826,500.00

Delaware

Newcastle	highway improvement	$800,000		
	Washington St. Bridge	10,000		
	Tole Street	20,000	$830,000.00	
Sussex			28,000.00	
				$858,000.00

Florida

Columbia	$40,000.00	
Duval	750,000.00	
Franklin	20,000.00	
Hillsboro	344,509.89	
Jackson	100,000.00	
Nassau, districts nos. 1, 2 and 3	60,000.00	
Palm Beach	200,000.00	
St. Lucie	195,000.00	
Walton	70,000.00	
1911		
Putnam	7,000.00	
		$1,786,509.89

Georgia

Cherokee, Canton	$29,000.00	
Clarke	78,000.00	
Hancock	51,000.00	
Spalding, road and bridges	4,000.00	
Troup	200,000.00	
Towns	4,000.00	
Turner	18,000.00	
1911		
Ben Hill	72,500.00	
Miller	25,000.00	
		$481,500.00

Idaho

Ada		$31,000.00	
Boise		16,900.00	
Canyon		123,470.00	
Custer		15,000.00	
Kootenai		83,071.00	
Lincoln, Shoshone district		80,000.00	
Oneida, district no. 1	$5,500		
Oneida, district no. 2	6,500		
Oneida, district no. 3	11,000		
		23,000.00	
Washington, good roads district no. 1		6,500.00	
			$378,941.00

Illinois

Bond, Central	$3,000.00	
Crawford, 6 townships	227,000.00	
De Kalb, Malta	8,500.00	
Edgar, townships	37,500.00	
Fulton, Orion	7,000.00	
Gallatin, townships	8,000.00	
Jackson, Carbondale	35,000.00	
Kankakee, townships	105,000.00	
Lee, townships	32,000.00	
Pike, townships	7,000.00	
St. Clair, townships	3,950.00	
Vermilion, townships	68,800.00	
Wabash, road district no. 3	12,000.00	
Whiteside, Sterling	16,000.00	
1911		
Carroll, townships	39,754.00	
Christian, Mt. Auburn	6,000.00	
Cook, townships	118,100.00	
Cumberland, Greenup	2,500.00	
Franklin, townships	4,850.00	
Hancock, townships	8,385.00	
Iroquois, townships	62,500.00	
La Salle, townships	52,250.00	
Ogle, townships	30,500.00	
Saline, townships	20,980.75	
White, townships	68,500.00	
Winnebago, townships	65,050.00	
		$1,050,119.75

Indiana

Adams, township	$534,466.79
Allen, township	134,132.00
Bartholomew, township	286,356.40
Benton	612,000.00
Boone	160,000.00
Carroll, bridge	40,000.00
Carroll (townships)	492,901.00
Clark	13,125.00
Clark, 11 townships	212,246.00

Clay	$407,518.65
Crawford	45,107.00
Daviess	437,734.16
Dearborn	192,272.07
Decatur, 9 townships	534,872.29
Dubois	196,949.95
Fayette, township	39,609.70
Franklin	240,924.00
Fulton, bridge	50,000.00
Gibson, 8 townships	527,780.00
Grant, townships and county	766,902.15
Greene, township	447,337.00
Hamilton, 9 townships	481,624.00
Huntington	301,289.64
Hancock	193,129.22
Hendricks, townships	315,846.09
Henry, townships	37,823.07
Jasper	290,785.00
Jay, townships	295,562.72
Jefferson, townships	116,702.76
Jennings, townships	151,215.99
Johnson, 3 townships	33,582.50
Knox, townships	811,810.60
Kosciusko, Jackson	1,440.00
Madison, townships	835,713.49
Marion	1,150,000.00
Marion, 7 townships	40,734.88
Marshall, Bourbon	28,500.00
Martin	90,000.00
Miami	202,000.00
Miami, townships	433,650.12
Montgomery	645,722.50
Monroe,	262,602.93
Morgan	292,000.00
Newton, townships	345,675.30
Ohio	11,950.00
Ohio, 3 townships	20,078.20
Owen	175,534.37
Parke	390,996.73
Pike, 3 townships	131,296.72
Porter	734,516.50
Posey, 3 townships	473,230.76
Rush	499,005.43
Scott, 5 townships	108,856.72
Spencer, townships	14,320.00
St. Joseph	499,200.00
Switzerland, townships	51,652.40
Tipton, townships	425,110.00
Union, townships	59,898.70
Vanderburg	173,596.17
Vermillion, 5 townships	292,132.00
Wabash, 6 townships	652,682.00
Wayne, 4 townships	210,720.00
White	415,679.80
Whitley	8,369.50

1911

Cass,	$352,718.00	
Clinton	120,000.00	
Delaware, township	865,000.00	
Fountain, townships	327,451.00	
Harrison, townships	118,753.00	
Howard, townships	440,000.00	
Lake, township	1,246,209.00	
Laporte, township	556,508.99	
Lawrence, townships	378,368.00	
Putnam, townships	471,297.00	
Randolph, townships	462,604.00	
Ripley	252,619.00	
Shelby, township	71,913.00	
Sullivan, township	695,209.95	
		$25,437,121.91

Iowa

Adams	$25,000.00	
Audubon, bridge	42,000.00	
Boone	60,450.00	
Calhoun	40,000.00	
Cass	100,000.00	
Carroll	40,000.00	
Cedar	23,000.00	
Cherokee	25,000.00	
Clarke	12,000.00	
Clinton, bridge	57,000.00	
Crawford	50,000.00	
Davis, bridge	47,500.00	
Decatur	19,000.00	
Des Moines, bridge	70,000.00	
Dickenson	10,000.00	
Fayette	25,000.00	
Fremont, bridge	27,000.00	
Iowa, bridge	50,000.00	
Jackson	29,000.00	
Kossuth	72,000.00	
Lee	41,000.00	
Lucas	31,600.00	
Madison	15,000.00	
Mahaska	60,000.00	
Mills, bridge	19,000.00	
Palo Alto, bridge	4,000.00	
Plymouth, bridge	12,000.00	
Union	70,000.00	
Van Buren	109,000.00	
Wapello, bridge	69,000.00	
Warren	71,000.00	
Winneshiek, bridge	95,000.00	
Wright, bridge	44,000.00	
Woodbury	33,000.00	

1911

Emmett	63,000.00	
Marion	65,000.00	
Polk	899,400.00	
Sac	23,000.00	
		$2,547.950.00

Kansas

Douglas, bridge	$66,500.00	
Edwards	20,000.00	
Finney, Garden City	5,000.00	
Gray	2,000.00	
Geary	89,600.00	
Hamilton, bridge	23,000.00	
Johnson	51,269.52	
Kiowa, Glick	5,000.00	
Neosho, townships	32,000.00	
Pawnee	8,000.00	
Sedgwick	100,000.00	
Sedgwick, 2 townships	11,795.25	
Wabaunsee, bridge, Kaw	6,000.00	
Wilson, Fall River	1,500.00	
Wyandotte, bridge	695,000.00	
Wyandotte, Quindare	5,000.00	
		$1,121,664.71

Kentucky

Bath	$24,000.00	
Bullitt	50,000.00	
Carroll	40,672.50	
Clark	60,000.00	
Christian	202,000.00	
Franklin	23,000.00	
Gallatin	28,500.00	
Grant	90,000.00	
Harrison	37,500.00	
Kenton	197,100.00	
Lewis	5,400.00	
Lincoln	22,000.00	
Madison	39,000.00	
Mason	60,000.00	
Montgomery	29,000.00	
Nicholas	24,000.00	
Pendleton	91,000.00	
Robertson	10,400.00	
Trimble	1,000.00	
Woodford	17,500.00	
1911		
Scott	95,000.00	
		$1,147,072.50

Louisiana

De Soto	$36,000.00	
Iberia	30,000.00	
Iberville, 3 districts	13,990.51	
Jefferson, 2 districts	200,000.00	
Plaquemines	60,000.00	
Washington	77,120.00	
		$417,110.50

Maryland

Allegany	$10,000.00	
Anne Arundel, bridges	37,000.00	
Caroline	15,000.00	
Charles	5,000.00	
Frederick	109,000.00	
Montgomery	101,900.00	
Prince George's	16,000.00	
Queen Anne's	13,000.00	
Talbot	7,000.00	
Worcester	75,000.00	
1911		
Cecil	100,000.00	
Dorchester	43,000.00	
		$531,900.00

Massachusetts

Essex	$412,000.00	
Nantucket	36,000.00	
1911		
Barnstable, 5 towns	143,300.00	
Bristol, 4 towns	94,000.00	
Franklin, 5 towns	53,000.00	
Hampden, 3 towns	155,000.00	
Hampshire, Amherst	50,000.00	
Middlesex, 3 towns	120,000.00	
Norfolk, 5 towns	82,256.25	
Plymouth, 3 towns	115,517.59	
Worcester, 2 towns	11,800.00	
		$1,272,873.84

Michigan

Bay		$255,000.00
Delta, bridge	$35,000	
Delta, road	17,500	
		52,500.00
Genesee		200,000.00
Gobegic		150,000.00
Huron, townships		137,000.00
Iron		150,000.00
Kalkaska, 3 townships		20,000.00
Kent, Grand Rapids		200,000.00
Leelanaw, Leelanaw		20,000.00
Lake, 2 townships		12,000.00
Mackinac, 2 townships		9,000.00
Macomb, 2 townships		86,000.00
Manistee		47,000.00
Mason		93,000.00
Mason, 2 townships		30,000.00
Muskegan		25,000.00
Ottawa		100,000.00
Wayne		600,000.00
Wexford, 2 townships		4,000.00

1911

Alger		$50,000.00	
Baraga, 2 townships		43,000.00	
Cheboygan, 3 townships		22,000.00	
Chippewa, Sugar Island		2,000.00	
Gladwin, Bourret		3,500.00	
Missaukee, 3 townships		8,000.00	
Monroe, 4 townships		149,000.00	
Newago, 2 townships		8,700.00	
Oceana, 7 townships		113,267.00	
Osceola, 6 townships		77,000.00	
Roscommon, 2 townships		33,500.00	
Saginaw, 6 townships		70,000.00	
St. Clair, 2 townships		28,000.00	
Sanilac, 2 townships		10,000.00	
Schoolcraft, 2 townships		10,000.00	
			$2,818,467.00

Minnesota

Aitkin		$16,000.00	
Anoka		11,500.00	
Cook		60,000.00	
Cottonwood, Rose Hill		1,200.00	
Crow Wing		46,000.00	
Crow Wing, Daggett Brook	$100.00		
Crow Wing, Little Pine	1,000.00		
		1,100.00	
Hennepin		110,000.00	
Itasca		31,000.00	
Koochiching		16,000.00	
Lake		16,000.00	
McLeod, Collins		3,000.00	
St. Louis		147,000.00	
1911			
Carlton, 8 townships		42,303.53	
Fillmore, Pilot Mount		7,500.00	
Mille Lacs, 6 townships		24,700.00	
Ramsey, White Bear		5,000.00	
Ramsey, county		75,000.00	
Red Lake, Terrebonne		1,700.00	
Scott, Belle Plaine		1,500.00	
			$616,503.53

Mississippi

Adams		$186,000.00	
Alcorn		95,000.00	
Benton, district		6,000.00	
Chickasaw, district no. 3		50,000.00	
Claiborne		25,000.00	
Clay		60,000.00	
Clay, district no. 1	$41,000.00		
Clay, district no. 2	60,000.00		
Clay, district no. 3	40,000.00		
		141,000.00	

Coahoma			$225,000.00	
Copiah			305,000.00	(about)
De Soto, bridges			25,000.00	
De Soto,	district no. 1	$75,000.00		
	district no. 2	50,000.00		
	district no. 3	50,000.00		
	district no. 5	50,000.00		
			225,000.00	
Franklin, bridge			35,000.00	
Forrest			20,000.00	
George			30,000.00	
Greene			25,000.00	
Grenada			45,000.00	
Hancock			100,000.00	
Hinds, districts nos. 1–5			300,000.00	
Issaquena			35,000.00	
Jasper			25,000.00	
Jefferson Davis			20,000.00	
Jefferson			24,500.00	
Jones			20,000.00	
La Fayette			25,000.00	
Lawrence			25,000.00	
Lee	district no. 3	$200,000.00		
	district no. 1	50,000.00		
			250,000.00	
Marshall			18,000.00	
Monroe	district no. 1	$50,000.00		
	district no. 4	100,000.00		
	district no. 5	50,000.00		
			200,000.00	
Noxubee	district no. 3	$125,000.00		
	district no. 2	52,500.00		
			177,500.00	
Oktibbeha, district no. 1			20,000.00	
Perry			37,850.00	
Pontotoc			20,000.00	
Prentiss, district no. 1			50,000.00	
Quitman			45,000.00	
Rankin, district no. 2			20,000.00	
Scott, district no. 1			50,000.00	
Sharkey			50,000.00	
Simpson			40,000.00	
Smith			40,000.00	
Tallahatchie	district no. 2	$25,000.00		
	district no. 3	25,000.00		
	dists. nos. 4 & 5	50,000.00		
			100,000.00	
Tunica			50,000.00	
Union, districts nos. 1, 2 and 4			50,000.00	
Warren			166.900.00	
Washington			100,000.00	
Wilkinson			19,872.00	
Yalobusha	district no. 4	$25,000.00		
	district no. 1	30,000.00		
			55,000.00	
Yalobusha			7,000,00	

1911		
Bolivar	$392.000,00	
Jackson	28,000.00	
Lamar	15,000.00	
Lauderdale	250,000.00	
Leflore	200,000.00	
Lincoln	150,000.00	
		$4,674,622.00

Missouri

Boone	Columbia special road district	$100,000.00		
	Harg special road district	20,000.00		
			$120,000.00	
Cedar, special district			19,000.00	
Christian			6,000.00	
Greene, (townships)			56,000.00	
Lafayette			125,000.00	
Lawrence, Mt. Vernon			50,000.00	
Mississippi			7,000.00	
Nodaway, Union			15,000.00	
Stone, (special district)			10,000.00	
Taney			7,500.00	
Vernon			20,000.00	
1911				
Callaway, special district			109,000.00	
Dade	Greenfield township	$30,000.00		
	South Greenfield township	17,000.00		
			47,000.00	
Laclede			10,000.00	
New Madrid, special district			93,000.00	
				$694,500.00

Montana

Custer	$320,000.00	
Dawson	89,000.00	
Flathead	52,500.00	
Lewis and Clark (emergency bonds issued 1909)	105,000.00	
Lincoln	125,000.00	
Meagher	30,000.00	
Musselshell	80,000.00	
Ravalli	72,106.15	
Rosebud	72,000.00	
Sanders	20,000.00	
Sweet Grass	35,000.00	
Valley	65,000.00	
		$1,065,606.15

Nebraska

Dawson			$17,000.00	
Garfield, bridge			4,000.00	
Keith			26,670.00	
Lincoln	Hershey	$20,000.00		
	Bostwick	4,000.00		
			24,000.00	
Merrick, Loup			1,500.00	
Morrill, bridge			14,000.00	
Nance			82,500.00	
Platte, 3 townships			15,000.00	
Scotts Bluff, 3 townships			37,000.00	
				$200,670.00

Nevada

Churchill	$10,000.00	
Douglas	11,000.00	
Ormsby	34,000.00	
Washoe	97,000.00	
		$152,000.00

New Hampshire

1911

Carroll, Wakefield	$50,134.57	
Cheshire, Dublin	19,000.00	
Grafton, Bristol	15,000.00	
Merrimack, Hooksett	26,000.00	
Rockingham, townships	135,000.00	
		$245,134.57

New Jersey

Burlington	$55,000.00	
Bergen	561,000.00	
Camden	378,900,00	
Cape May	259,300.00	
Cumberland	43,000.00	
Essex	1,140,505.63	
Gloucester	157,400.00	
Hudson	5,629,375.92	
Hunterdon	148,000.00	
Mercer	555,150.00	
Middlesex	397,600.00	
Morris	300,000.00	
Passaic	805,500.00	
Salem	40,000.00	
Somerset	80,000.00	
Sussex	150,100.00	
Union	615,000.00	
1911		
Atlantic	190,000.00	
		$11,505,831.55

New Mexico

Bernalillo	$130,000.00	
Dona Ana	100,000.00	
Eddy	28,500.00	
San Juan, bridge	17,600.00	
1911		
Socorro	190,600.00	
		$466,700.00

New York

Allegany, 2 townships	$14,000.00	
Chemung	99,670.00	
Chemung, 3 townships	40,283.16	
Chautauqua, Westfield	28,000.00	
Cortland, 4 townships	22,800.00	
Erie,	1,262,000.00	
Franklin	433,000.00	
Franklin, 3 townships	18,000.00	
Fulton, Cawga	35,000.00	
Genesee, Le Roy town	12,000.00	
Hamilton, Long Lake	30,000.00	
Herkimer	396,000.00	
Lewis	25,244.00	
Livingston	41,084.76	
Nassau	1,507,749.15	
Ontario	176,000.00	
Orange	682,000.00	
Orleans	115,850.00	
Otsego	60,000.00	
Putnam, Putnam Valley	25,000.00	
Rensselaer	339,500.00	
Seneca	35,228.70	
St. Lawrence	110,000.00	
Steuben	50,000.00	
Steuben, 3 townships	16,480.00	
Tompkins	73,000.00	
Tompkins, towns	47,600.00	
Ulster	164,000.00	
Warren	123,000.00	
Weschester	158,100.00	
1911		
Albany	180,000.00	
Clinton	135,000.00	
Columbia	56,000.00	
Green	64,000.00	
Jefferson	140,000.00	
Montgomery	108,123.00	
Oneida	80,000.00	
Saratoga	150,000.00	
Suffolk	65,000.00	
Wyoming	50,000.00	
		$7,168,712.77

North Carolina

Anson, Wadesboro		$2,000.00	
Beaufort		75,000.00	
Bertie		18,000.00	
Buncombe		50,000.00	
Cabarrus		105,000.00	
Cleveland, bridge		50,000.00	
Cleveland { No. 6 township	$50,000.00		
Cleveland { Kings Mountain Precinct	25,000.00		
		75,000.00	
Cleveland (bridge)		50,000.00	
Craven		55,000.00	
Cumberland		39,000.00	
Gaston		300,000.00	
Granville		160,000.00	
Guilford		300,000.00	
Hoke		50,000.00	
Iredell		275,000.00	
Jones, bridge		10,000.00	
Lee		100,000.00	
McDowell		9,273.25	
New Hanover		200,000.00	
Pamlico		3,000.00	
Richmond, 7 districts		100,000.00	
Scotland, 4 districts		130,000.00	
Vance		18,000.00	
Wilson, Wilson township		100,000.00	
1911			
Hayward		35,000.00	
Nash		20,000.00	
Orange		230,000.00	
Pitt		50,000.00	
Sampson		29,000.00	
Washington		75,000.00	
			$2,713,273.25

North Dakota

Eddy, Paradise	$2,000.00	
Stark, bridge	6,500.00	
Stutsman	12,500.00	
		$21,000.00

Ohio

Adams	$122,000.00
Athens	200,000.00
Ashtabula	161,500.00
Belmont	10,000.00
Champaign	23,750.00
Clark	46,000.00
Clermont	77,000.00
Columbiana	355,000.00
Coshocton, 4 townships	36,000.00
Crawford, townships and road district no. 1	605,500.00

Cuyahoga	$6.274,524.00
Darke, bridge	29,500.00
Defiance	48,000.00
Erie, bridge	59,500.00
Erie, Groton	10,000.00
Fayette, bridge	6,000.00
Fulton	204,440.00
Gallia	503,500.00
Geauga	20,000.00
Geauga, Hambden	3,000.00
Hamilton	917,650.00
Hancock	320,900.00
Harrison, bridge	10,000.00
Henry	908,500.00
Hocking	30,000.00
Jackson	380,000.00
Jefferson, bridge	50,000.00
Knox, township	10,000.00
Knox	51,000.00
Lake	133,500.00
Lawrence	525,000.00
Licking	310,000.00
Logan	22,500.00
Lucas	348,805.69
Lorain	598,000.00
Madison	41,700.00
Mahoning	1,408,108.50
Marion	402,346.00
Mercer	511,300.00
Miami	123,000.00
Miami, 2 townships	9,000.00
Montgomery	120,000.00
Morgan	28,000.00
Muskingum	398,000.00
Noble	10,000.00
Noble, 2 townships	38,000.00
Ottawa	82,000.00
Ottawa, 5 townships	135,450.00
Paulding	400,000.00
Pickaway	35,000.00
Portage	76,000.00
Preble, bridge	11,160.00
Putnam	347,600.00
Ross	45,000.00
Sandusky	103,108.34
Shelby, bridge	17,000.00
Stark, 3 townships	49,000.00
Summit	414,875.00
Trumbull	200,000.00
Trumbull, district	140,000.00
Union	215,500.00
Warren	22,000.00
Williams	15,000.00
Wood	632,000.00

1911		
Delaware	$553,390.00	
Franklin	513,260.00	
Morrow	56,172.00	
Richland	95,000.00	
Scioto	40,000.00	
Seneca	242,500.00	
		$20,941,540.53

Oklahoma

Carter	$200,000.00	
Carter, 2 townships	50,000.00	
Choctaw	120,000.00	
Coal, bridge	35,000.00	
Creek, bridge	200,000.00	
Grady	60,000.00	
Johnston, bridge	100,000.00	
Kay, Miller	18,000.00	
Muskogee	140,000.00	
Nowata	100,000.00	
Okfuskee	100,000.00	
Osage	100,000.00	
Stephens, King	27,500.00	
Wagoner	75,000.00	
Wagoner, Stone Bluff	4,500.00	
		$1,230,000.00

Pennsylvania

Allegheny	$14,350,000.00	
Beaver, bridge	554,000.00	
Bedford, 3 townships	9,500.00	
Berks	359,500.00	
Cameron, 3 townships	3,000.00	
Clinton	58,600.00	
Columbia	86,000.00	
Indiana	35,800.00	
Lackawanna	250,000.00	
Lebanon, bridge	29,850.00	
Lehigh	200,000.00	
Lycoming	356,400.00	
Northampton	300,000.00	
Susquehanna, Brooklyn township	6,000.00	
Venango, bridge	282,000.00	
Washington	1,177,000.00	
Wyoming	72,000.00	
York	68,000.00	
1911		
Bucks, 3 townships	138,333.00	
Butler, 2 townships	8,500.00	
Delaware, 8 townships	234,700.00	
Luzerne, 4 townships	102,300.00	
Montgomery, 9 townships	619,500.00	
Warren, 4 townships	28,200.00	
		$19,329,183.00

South Carolina

Anderson	$40,000.00	
Dillon	100,000.00	
Horry	10,000.00	
Kershaw	40,000.00	
Oconee	45,000.00	
Sumter	20,000.00	
1911		
Laurens	50,000.00	
Marion	40,000.00	
		$345,000.00

South Dakota

Sanborn	$22,608.54	
Stanley, 3 townships	10,500.00	
		$33,108.54

Tennessee

Anderson	$300,000.00
Bradley	191,000.00
Campbell	200,000.00
Carter, Elizabeth	65,000.00
Carter	72,944.00
Claiborne	70,000.00
Cocke	306,500.00
Coffee	4,153.53
Cumberland	40,000.00
Davidson	190,000.00
Grainger	100,000.00
Greene	300,000.00
Hamblen	277,000.00
Hawkins	220,000.00
Hickman	62,500.00
Jackson	150,000.00
Jefferson	395,000.00
Knox	255,000.00
Monroe	300,000.00
Morgan	43,000.00
McMinn	325,000.00
Maury, bridge	12,000.00
Perry, bridge	4,500.00
Putnam	250,000.00
Roane	255,000.00
Robertson	450,000.00
Sullivan	300,000.00
Sumner	200,000.00
Warren	168,000.00
Wayne	16,200.00
White	90,000.00
1911	
Blount	300,000.00
Hamilton	65,000.00
Loudon	100,000.00
Madison	500,000.00

Marion	$160,000.00	
Polk	73,000,00	
Sevier	60,500.00	
Washington	60,000.00	
		$6,931,097.53

Texas

Anderson			$150,000.00
Atascosa			43,000.00
Austin	district no. 1	$100,000.00	
	district no. 2	50,000.00	
	district no. 3	25,000.00	
			175,000.00
Bastrop	district no. 1	$100,000.00	
	district no. 2	80,000.00	
			180,000.00
Baylor, special road district			100,000.00
Bee			49,122.00
Bexar			633,500.00
Borden			4,900,00
Bosque, district no. 7			40,000.00
Brazoria, including district no. 3			290,000.00
Brooks			45,000.00
Brown			148,000.00
Burnet			29,000.00
Calhoun			100,000.00
Calhoun, district no. 1			100,000.00
Callahan			1,276.00
Cass, district no. 7			35,000.00
Chambers			60,000.00
Coke			25,000.00
Colorado			30,000.00
Comal			41,000.00
Concho			14,000.00
Dallas			1,153,650.00
Denton, district no. 1			75,000.00
El Paso			250,000.00
Falls, bridge			80,000.00
Fannin			1,900.00
Fayette, bridge			60,500.00
Fisher			19,000.00
Freestone, R. D. no. 1			50,000.00
Frio			4,963.00
Galveston			1,089,900.00
Gonzales, district no. 1			150,000.00
Grayson			400,000.00
Grimes			134,000.00
Harris			3,229,000.00
Haskell			16,000.00
Hays			87,000.00
Hill			102,000.00
Hidalgo			80,000.00
Houston			14,000.00
Houston	district no. 1	$24,000.00	
	district no. 2	150,000.00	
			174,000.00

Howard	$100,000.00
Jefferson	778,500.00
Jones	4,000.00
Karnes	42,000.00
Kent	10,000.00
Kerr	20,000.00
King	5,000.00
Lamar, Justice precinct	100,000.00
Lampasas	16,500.00
Lavaca	22,000.00
Limestone	20,000.00
Live Oak	16,990.00
Llano	21,000.00
Maverick	42,602.00
McCulloch, district no. 1	75,000.00
McLennan, bridge	31,000.00
McMullen, bridge	4,000.00
Medina	60,000.00
Mills	5,400.00
Mitchell, district no. 1	30,000.00
Motley	25,000.00
Nolan	100,000.00
Nueces	10,590.00
Orange	200,000.00
Parker, bridge	25,000.00
Potter	20,000.00
Reeves	12,000.00
Refugio, bridge	51,000.00
Runnels	29,000.00
Somervell	16,900.00
Stephens	18,000.00
Stonewall	50,000.00
Sutton	5,000.00
Tarrant	1,834,000.00
Tom Green	26,000.00
Travis	350,000.00
Waller	25,000.00
Ward, precinct no. 4	5,000.00
Wheeler	15,000.00
Williamson	300,000.00

1911

Caldwell	225,000.00
Childress	12,000.00
Dickens	10,500.00
Ellis	950,000.00
Foard	83,000.00
Fort Bend	325,000.00
Guadalupe	239,500.00
Hardin	169,000.00
Hardeman	23,000.00
Hemphill	10,000.00
Hood	36,499.00
Jackson	124,500.00
Johnson	61,200.00
Liberty	100,000.00
Leon	84,000.00

San Jacinto	$3,000.00	
San Patricio	133,000.00	
San Saba	4,000.00	
Shackleford	12,500.00	
Throckmorton	2,000.00	
Upshur	49,000.00	
Victoria	48,700.00	
Wichita	31,000.00	
Wood	150,000.00	
Young	64,000.00	
		$16,936,592.00

Utah

Box Elder	$175,000.00	
Cache	23,000.00	
Emery	35,000.00	
Grand, bridge	8,500.00	
Uinta	8,000.00	
Weber	92,000.00	
1911		
Carbon	30,000.00	
		$371,500.00

Vermont

Grand Isle, 3 towns	$4,000.00

Virginia

Alleghany, bridge			$40,000.00
Amherst			215,000.00
Botetourt			10,000.00
Brunswick			84,000.00
Clarke			90,000.00
Culpepper	Stevensburg	$45,000.00	
	Catalpa	120,000.00	
			165,000.00
Dickenson, Clintwood			54,000.00
Dinwiddie, 4 districts			100,500.00
Elizabeth City			22,000.00
Fauquier, Centre			35,000.00
Fluvanna			1,300.00
Giles, bridge			30,000.00
Lee	Rose Hill	$65,000.00	
	Jonesville	89,000.00	
	Rocky Station	100,000.00	
	Yoakum Station	110,000.00	
			364,000.00
Mecklenburg	Chase City	$60,000.00	
	Clarksville	50,000.00	
	Boydton	75,000.00	
	Buckhorn	40,000.00	
	South Hill	50,000.00	
	Lacrosse	50,000.00	
	Palmer Springs	25,000.00	
			350,000.00
Montgomery			30,000.00
Norfolk			275,000.00

Northampton, Franktown		$20,000.00	
Orange, Madison		42,000.00	
Page		18,000.00	
Pittsylvania		50,000.00	
Pulaski, Pulaski district		70,000.00	
Rappahannock, Wakefield		30,000.00	
Rockingham		10.000,00	
Russell		314,000.00	
Smyth, Rich Valley		50,000.00	
Spottsylvania { Courtland	$60,000.00		
Chancellor	40,000.00		
		100,000.00	
Tazewell, 3 districts		625,000.00	
Warren { Pence	$30,000.00		
Budge	30,000.00		
		60,000.00	
Wise, Gladville and Richmond districts		260,000.00	
			$3,514,800.00

Washington

Clallam	$100,000.00	
Cowlitz	69,261.97	
Lewis	55,000.00	
Pacific	100,000.00	
		$324,261.97

West Virginia

Cabell	$90,000.00	
Hancock, Grant	125,000.00	
Marshall	150,000.00	
Wood, Parkersburg district	180,000.00	
1911		
Monongalia	30,800.00	
		$575,800.00

Wisconsin

Ashland	$25,000.00	
Florence	36,000.00	
Iron	35,000.00	
Marinette	5,625.00	
Rusk	7,000.00	
Sauk, Delton	16,000.00	
Taylor, Roosevelt	6,000.00	
Taylor	2,500.00	
Vilas	53,000.00	
		$186,125.00
Total counties and townships		$155,633,955.49

Recapitulation of County and Township Bonds Outstanding

Alabama	$3,760,000.00
Arizona	76,000.00
Arkansas	766,500.00
California	10,021,162.00
Colorado	87,000.00
Connecticut	826,500.00
Delaware	858,000.00
Florida	1,786,509.89
Georgia	481,500.00
Idaho	378,941.00
Illinois	1,050,119.75
Indiana	25,437,121.91
Iowa	2,547,950.00
Kansas	1,121,664.71
Kentucky	1,147,072.50
Louisiana	417,110.50
Maryland	531,900.00
Massachusetts	1,272,873.84
Michigan	2,818,467.00
Minnesota	616,503.53
Mississippi	4,674,622.00
Missouri	694,500.00
Montana	1,065,606.15
Nebraska	200,670.00
Nevada	152,000.00
New Hampshire	245,134.57
New Jersey	11,505,831.55
New Mexico	466,700.00
New York	7,168,712.77
North Carolina	2,713,273.25
North Dakota	21,000.00
Ohio	20,941,540.53
Oklahoma	1,230,000.00
Pennsylvania	19,329,183.00
South Carolina	345,000.00
South Dakota	33,108.54
Tennessee	6,931,097.53
Texas	16,936,592.00
Utah	371,500.00
Vermont	4,000.00
Virginia	3,514,800.00
Washington	324,261.97
West Virginia	575,800.00
Wisconsin	186,125.00

$155,633,955.49

COUNTY AND TOWNSHIP ROAD AND BRIDGE BONDS VOTED IN 1912

COUNTY	AMOUNT	INTEREST	TERM	TOTAL
Alabama				
Dallas	$100,000.00	5	30 yrs.	
Lawrence	123,000.00	6	30	
Perry	110,000.00	5	30	
Russell	100,000.00	5	30	
Sumter	120,000.00	5	20	$553,000.00
Arizona				
Maricopa, road district no. 1	$30,000.00	6	20	$30,000.00
California				
Orange, Bridge	$100,000.00	5		
Orange, Highway	1,270,000.00	5		
Santa Barbara, Carpinteria district	50,000.00	6	20	$1,420,000.00
Florida				
Dade	$250,000.00			
Franklin	20,000.00	4½	20	
Pinellas	370,000.00	5	30	
Polk, Winter Haven	130,000.00			
Palm Beach, district no. 1	85,000.00			
Palm Beach, district no. 2	60,000.00			$915,000.00
Idaho				
Bear Lake	$45,000.00	5½	20	
Boise	70,000.00			
Canyon	47,620.00	5	10	
Lincoln, Shoshone district	80,000.00	6	10 to 20	$242,620.00

Illinois

Crawford	Robinson	$25,000.00			
	Lamotte	20.000.00			
	Honey Creek	25,000.00			
DeKalb, Malta		8,500.00	5	2	
Douglas	Boudre	35,000.00	5	13	
	Sargent	35,000.00	5	2 to 7	
Edgar	Embarrass	35,000.00	5	10	
	Elbridge	2,500.00	6		
Gallatin	Bowlesville	1,000.00	4	1 to 2	
	Shawnee	7,000.00	4	1 to 5	
Lee	Ashton	22,000.00			
	China	10,000.00			
Pike	Fairmount	300.00			
	Perant Hill	1,200.00			
	Hadley	525.00			
	Derry	3,075.00	5	1, 2, 3	
	Kniderhook	700.00			
	Hardin	1,200.00			
Sangamon, Salisbury		6,000.00	5	5	$239,000.00

Indiana

Allen	Jackson	$36,320.00	4½	1 to 20
	Lafayette	22,800.00	4½	1 to 20
Bartholomew	township	11,520.00	4½	10
	township	36,986.00	4½	10
	township	1,930.00	4½	10
Boone	Sugar Creek	2,400.00	4½	10
	Perry	6,000.00	4½	10
Clark	Washington	11,000.00	4½	10
	Carr	13,700.00	4½	10
Dearborn		66,063.19	4½	1–20
Fountain		122,750.00	4½	10
Franklin, 3 townships		54,506.00	4	10
Grant		550,000.00	4½	10
Hamilton		79,500.00	4½	10

COUNTY AND TOWNSHIP ROAD AND BRIDGE BONDS VOTED IN 1912—Continued

COUNTY			AMOUNT	INTEREST	TERM	TOTAL
Henry			$10,200.00	4½	10 yrs.	
Huntington			52,987.50	4½	10	
Jasper	Hanging Grove		5,800.00	4½	10	
	Keener		18,000.00	4½	10	
Jay	Jackson	$8,720.00				
	Richland	16,000.00				
	Madison	4,410.00				
			29,130.00	4½	10	
Johnson	Hensley	$2,200.00				
	Needham	8,200.00				
			10,400.00	4½	10	
Madison			99,380.00	4½	10	
Marshall, Bourbon			28,500.00	4½	15	
Martin	Halbert	$31,166.00			Due 1913	
	Center	39,373.00			Due 1922	
	Perry	19,950.00			Due 1924	
	Baker	5,092.00			Due 1924	
			95,581.00			
Miami	townships		17,100.00	4½	10–20	
	townships		15,450.00	4½	10–20	
Montgomery			645,722.50	4½	10	
Morgan, Jefferson			21,000.00	4½	10	
Owen, Marion			8,972.40	4½	40	
Perry, Troy			73,000.00	4½	20	
Scott	Jennings	$8,000.00				
	Lexington	5,200.00				
	Vienna	20,000.00				
			33,200.00	4½	10	
Spencer			14,320.00	4½	10	
St. Joseph			60,000.00	4	16	
Switzerland			22,970.00	4½	10	

Wayne	Wayne	$127,500.00				
	Green	12,000.00				
			139,500.00	4½	10	
White			57,600.00	4½	10	$2,437,968.59
Iowa						
Boone			$25,450.00	4½	12	
Iowa			30,000.00	4½	5, 8, 10	$55,450.00
Kansas						
Geary	Junction City		$3,600.00	6	10	
	Junction City		86,000.00	5	9	
Kiowa, Glick			5,000.00	5	Serial 1st 1918	
Wilson	Guilford	$2,000.00				
	Center	2,000.00				
			4,000.00			
Wyandotte			290,000.00	4½	Serial 1932–1941	$388,600.00
Kentucky						
Robertson			8,000.00	5	5, 6, 7, 8	$8,000.00
Louisiana						
Acadia			$88,000.00			
Iberville			13,990.51	5	1–10	
Jefferson	district no. 1		100,000.00	5		
	district no. 2		100,000.00	5		$301,990.51
Maryland						
Montgomery	Bethesda Rockville		12,000.00	4½	12	
	Wheaton Rockville Darnestown		35,000.00	4½	35	$47,000.00

COUNTY AND TOWNSHIP ROAD AND BRIDGE BONDS VOTED IN 1912—Continued

Massachusetts

COUNTY	AMOUNT	INTEREST	TERM	TOTAL
Bristol, North Attleboro	$6,000.00	4	1-6 yrs.	
Nantucket, Nantucket	2,000.00	5	10	$8,000.00

Michigan

COUNTY		AMOUNT	INTEREST	TERM	TOTAL
Delta		$100,000.00	4½	Serial	
Genesee		500,000.00	4½	20	
Gogebic		150,000.00	4½	10	
Grand Traverse Paradise		30,000.00			
Huron Schewing	$75,000.00				
Windsor	50,000.00				
		125,000.00			
Kalkaska Clearwater	$6,000.00		4½	10	
Springfield	9,000.00				
Coldspring	5,000.00				
		20,000.00			
Leelaunau, Leelaunau		20,000.00			
Lake Ellsworth	$6,000.00				
Newkirk	6,000.00				
		12,000.00			
Mackinac Hudson	$4,000.00				
Newton	5,000.00				
		9,000.00			
Ottawa		600,000.00	4½	20	
Wayne		500,000.00	4	1–5	
Wexford Springville	$5,000.00				
Horing	2,000.00	7,000.00	5	2	$2,073,000.00

Minnesota

Beltrami			550,350.00	4–5½	5–20 yrs.	
Carlton	Blackhoof	$3,000.00		4	15	
	Corona	1,500.00		4	15	
	Mahtowa	3,000.00		4	20	
	Split Rock	3,000.00		4	13	
	Red Clover	2,000.00		4	13	
Koochiching	Reedy	6,000.00		4	10	
	Meding	7,000.00		6	7	
	Bannock	3,000.00		4	10	
			$16,000.00			
McLeod, Collins			3,000.00	4	1918–1927	$581,850.00

Mississippi

Attalla, district no. 1			$50,000.00	5	25
Calhoun, district no. 1		about	40,000.00		
Coahoma			50,000.00	5	30
Chickasaw, district no. 3			50,000.00	5	20
Covington			50,000.00		
Forrest			100,000.00	5	10–25
George			30,000.00	6	30
Grenada			45,000.00	5	20
Hancock			100,000.00	6	20
Jackson			45,000.00		
Jasper			25,000.00	5	25
La Fayette			25,000.00	5½	
Lee, district no. 1			50,000.00	5½	25
Monroe	district no. 1		125,000.00	5	25
	district no. 4		250,000.00	5	25
	district no. 5		85,000.00	5	25
Montgomery, district no. 1			40,000.00	5	10–20
Noxubee	district no. 2		52,500.00	5½	25
	district no. 3		150,000.00	5½	25
	district no. 5		75,000.00	5½	25
	district no. 1		100,000.00	5½	25

COUNTY AND TOWNSHIP ROAD AND BRIDGE BONDS VOTED IN 1912—Continued

COUNTY	AMOUNT	INTEREST	TERM	TOTAL
Prentiss, district No. 1	$50,000.00	6	20 yrs.	
Scott, district no. 1	75,000.00	6	20	
Tallahatchie, district no. 1	25,000.00	6	25	
Warren	65,400.00	5	20	
Yalobusha	7,000.00	5½	25	
Yalobusha, district no. 4	25,000.00	5	25	$1,784,900.00
Missouri				
Boone, Harg	$20,000.00	6	10	
Callaway Fulton	100,000.00			
Special	100,000.00			
Cedar	19,000.00	5½	2–15	
Clay Birmingham	70,000.00			
Sugar Grove	65,000.00			
Dade	47,000.00			
Howell	30,000.00			
Laclede	50,000.00			
Lawrence, Mt. Vernon	50,000.00	5	15	
Mississippi, Pin Hook	7,000.00	9	19	
Nodaway, Union	15,000.00	6	Serial	
Stone, Galena	10,000.00	6	17	
Vernon, Center	20,000.00	6	5	$603,000.00
Montana				
Blaine	$40,000.00	5	20	
Cascade	60,000.00			
Custer	170,000.00	4½	20	
Musselshell	50,000.00	5	20	
Teton, voted Jan. 1, 1913	100,000.00	5	5–20	
Valley	65,000.00	5	20	$485,000.00
Nebraska				
Scotts Bluff, Gering	$10,000.00	5	20	$10,000.00

New Jersey

Bergen	$11,000.00	4½	30 yrs.	
Burlington, bridges	30,000.00	4½		
Camden	57,000.00	4½	5	
Cape May	53,500.00			
Cumberland	9,000.00	4½	9	
Essex	100,000.00	4	40	
Essex	22,000.00	4	20	
Gloucester	135,000.00	4½	1/1/13– 4/1/39	
Hudson	320,666.00	4–4½		
Hunterdon	45,000.00	4	52	
Mercer	40,500.00	4	20 and 30	
Middlesex	48,000.00	4½		
Sussex	17,600.00			$889,266.00

New Mexico

Cuny	$500,000.00			
Dona Ana	100,000.00	5	20–30	
Torrance	500,000.00			$1,100,000.00

New York

Chautauqua, French Creek	$3,000.00	4½	3	
Chautauqua, Kiantone	4,000.00	4½	4	
Chemung, Big Flats	16,875.36	4½		
Chemung, Chemung	20,000.00	4½		
Chemung, Elmira	3,407.80			
Fulton, Cawga	35,000.00	5	1912–18	
Lewis	12,035.60	5	25	
Lewis, Denmark	6,000.00	5	6	
Nassau	240,000.00	4½	5–20	
Orleans	21,750.00	5	6	
Putnam, Putnam Valley	25,000.00	4¼	1918–30	
St. Lawrence	125,000.00	4	4–9	
Steuben, Corning	4,000.00	5	1914–17	

COUNTY AND TOWNSHIP ROAD AND BRIDGE BONDS VOTED IN 1912—Continued

COUNTY	AMOUNT	INTEREST	TERM	TOTAL
Tompkins	$23,000.00	4¼	Serial	
Tompkins, Lansing	5,000.00	4½	Serial	
Warren	50,000.00	5	11	
Westchester, White Plains	30,000.00			
Westchester	80,560.00			$703,628.76
North Carolina				
Cleveland, township	50,000.00	5	1914–1948	
Lee	100,000.00	5	40	$150,000.00
Ohio				
Belmont, Washington	$10,000.00	5		
Erie, Groton	25,000.00	4½	1–5	
Lucas { road	83,720.93	5	1½	
Lucas { bridge	55,813.95	5	1½	
Montgomery	30,000.00	4½		
Ottawa, townships	64,200.00	5		
Paulding	24,000.00	5	7	
Putman	155,000.00	5	5–10	
Summit	40,000.00			
Trumbull, R. D. no. 1	60,000.00			$547,734.88
Oklahoma				
Cleveland Norman City	20,000.00	6	20	
Stephens, King	27,500.00	6	Option 15	$47,500.00
Pennsylvania				
Berks	475,000.00	3½	2–12	
Cameron, Shippen	2,000.00	6	2	
Clinton	58,600.00	4		$583,100.00

South Dakota

Pennington, bridge			$44,000.00	5	1–10 yrs.	
Stanley	Kadoka		5,000.00	6	5	
	Shaner		2,000.00	6	5	
	Ash Creek		3,500.00	5	5	$54,500.00

Tennessee

Cheatham			$100,000.00			
Hamblen			25,000.00	5	40	
Monroe			300,000.00	5	15–20–25	
Sullivan			200,000.00	4½	20–30	
Sumner			200,000.00	4½	30	
White			90,000.00			$915,000.00

Texas

Anderson, district no. 1			$150,000.00	5	Option 20	
Austin	district no. 1	$100,000.00				
	district no. 2	50,000.00				
	district no. 3	25,000.00				
			175,000.00	5	5 to 40	
Bastrop	road district no. 1		100,000.00	5	20	
	road district no. 2		80,000.00	5	40	
Baylor, special road bonds			100,000.00	4	40	
Bee			15,000.00	5	20	
Bosque, district no. 7			40,000.00		40	
Brazoria, district no. 3			150,000.00	5½	34	
Brooks			45,000.00	5	40	
Calhoun			135,000.00	5	40	
Cass, district no. 7			35,000.00	5	40	
Chambers, district no. 1			6,000.00	5	20	
Denton, district no. 1			75,000.00	5	40	
El Paso	district no. 1	$10,000.00		5	40	
	district no. 2	397,000.00		5	40	
			407,000.00			
Gonzales, district no. 1			150,000.00	5		

COUNTY AND TOWNSHIP ROAD AND BRIDGE BONDS VOTED IN 1912—Continued

COUNTY		AMOUNT	INTEREST	TERM	TOTAL
Grayson, district no. 2		$400,000.00	5	40 yrs.	
Harris { district no. 5		136,000.00	5	Serial	
Harris { district no. 6		76,000.00	5		
Kerr		20,000.00	5	5–40	
Limestone, district no. 4		150,000.00	5	10–40	
McLennan, district no. 1		100,000.00	5	40	
Medina, district no. 4		40,000.00	5	40	
Montgomery, district no. 1		250,000.00	5	40	
Nolan		15,000.00			
Somervell, district no. 1		16,900.00			
Sterling		10,000.00		40	
Tarrant		1,600,000.00	5	40	
Wharton, district no. 1		300,000.00	5	Serial	$4,776,900.03
Utah					
Boxelder		$175,000.00	4½	20	
Grand		8,500.00	5	20	$183,500.00
Virginia					
Augusta, South River		$250,000.00			
Culpepper, Catalpa		120,000.00	5	Serial	
Dickenson, Clintwood		54,000.00	5	2–30	
North Hampton, Franktown		20,000.00	4½	30	
Orange { Taylor	$75,000.00				
Orange { Barbour	50,000.00				
		125,000.00	5	20, Option 10	
Pittsylvania, Dan River		100,000.00	5	34	
Pulaski, Dublin		100,000.00	5	10–30	
Rockingham, Plains		30,000.00	6	10	
Smyth { Marion	$150,000.00				
Smyth { St. Clair	75,000.00				
		225,000.00	5	30	

Tazewell	Clearfork	$25,000.00			
	Jeffersonville	200,000.00		1913–1938	
	Maiden Spring	175,000.00			
Wise	Gladville	130,000.00			
	Richmond	130,000.00			$1,944,000.00
Washington					
Clallam		$300,000.00	5	20	
King		3,000,000.00	not over 5	20	
Lewis		55,000.00			
Okanogan, district no. 1		15,000.00	not over 10	10	$3,370,000.00
West Virginia					
Hancock		$25,000.00	5	10–34	
Hancock, Butler		125,000.00	5	20–34	
Marion	Mannington	300,000.00	5	35	
	Fairmont	400,000.00	5	35	
Marshall, Union district		150,000.00	5	34	
Wood, Parkersburg district		180,000.00	4½	30	$1,180,000.00
Wisconsin					
Ashland		$25,000.00			
Iron		35,000.00	4	6	
Vilas		60,000.00	5	20	$120,000.00
Total county and township					$28,749,508.77

Recapitulation

Alabama	$553,000.00
Arizona	30,000.00
California	1,420,000.00
Florida	915,000.00
Idaho	242,620.00
Illinois	239,000.00
Indiana	2,437,968.59
Iowa	55,450.00
Kansas	388,600.00
Kentucky	8,000.00
Louisiana	301,990.51
Maryland	47,000.00
Massachusetts	8,000.00
Michigan	2,073,000.00
Minnesota	581,850.00
Mississippi	1,784,900.00
Missouri	603,000.00
Montana	485,000.00
Nebraska	10,000.00
New Jersey	889,266.00
New Mexico	1,100,000.00
New York	703,628.76
North Carolina	150,000.00
Ohio	547,734.88
Oklahoma	47,500.00
Pennsylvania	583,100.00
South Dakota	54,500.00
Tennessee	915,000.00
Texas	4,776,900.03
Utah	183,500.00
Virginia	1,944,000.00
Washington	3,370,000.00
West Virginia	1,180,000.00
Wisconsin	120,000.00
Total	$28,749,508.77

Bonds to be Voted in 1913

STATE	COUNTY	TOWNSHIP	AMOUNT
Arizona	Mohave		$100,000.00
California	Kern		2,500,000.00
	San Mateo		1,250,000.00
Florida	Hernando		100,000.00
	Pasco		150,000.00
Idaho	Twin Falls		35,000.00
Illinois	Sangamon	Springfield	10,000.00
Indiana	Bartholomew		25,570.00
	Boone	Sugar Creek and Washington	9,378.00
	Dubois		25,000.00
	Franklin		12,000.00
	Hamilton	Hamilton	20,000.00
	Hendricks	Lincoln	28,900.00
	Jay	Wabash	3,800.00
	St. Joseph		24,000.00
Iowa	Madison		25,000.00
Kansas	Geary	Junction City	50,000.00
Kentucky	Bell		300,000.00
	Clinton		50,000.00
	Hart		200,000.00
Louisiana	De Soto		28,000.00
Maryland	Queen Anne		50,000.00
	Talbot		30,000.00
Massachusetts	Essex		120,000.00
Michigan	Arenac	Berrien	500,000.00
	Delta		10,000.00
	Emmett	Emmett	225,000.00
	Ionia	Danby	20,000.00
	Iron	Stambaugh	10,000.00
	Mackinac		100,000.00
	Menominee		125,000.00
	Wayne		1,000,000.00
Mississippi	Copiah		75,000.00
	Itawamba		65,000.00
	Neshoba		100,000.00
	Quitman		25,000.00
	Warren		9,300.00
Nebraska	Lincoln		15,000.00
New Mexico	San Juan		30,000.00
New York	Cayuga		11,000.00
	Franklin		100,000.00
	Tompkins		54,000.00
North Carolina	Caldwell		200,000.00
	Edgecombe		200,000.00
	Lincoln		200,000.00
	Mitchell		100,000.00
	Montgomery		15,000.00
	Person		150,000.00
	Stokes		300,000.00
Ohio	Paulding		70,000.00
Oklahoma	Woods		1,000,000.00

Bonds to be Voted in 1913—Continued

STATE	COUNTY	TOWNSHIP	AMOUNT
Pennsylvania	Carbon		$50,000.00
	York		35,000.00
South Carolina	Sumter		10,000.00
Tennessee	Benton		200,000.00
	Greene		500,000.00
	Jefferson		15,000.00
	Sullivan		30,000.00
Texas	Atascosa	Precinct 3	20,000.00
	Brazoria		50,000.00
	Brazoria	District No. 4	250,000.00
	Callahan	District No. 2	150,000.00
	Chambers		100,000.00
	Frio		80,000.00
	Harris		1,000,000.00
	Limestone	District No. 6	175,000.00
	Navarro		300,000.00
	Orange		30,000.00
	Robertson	Coms. Precinct 1.	150,000.00
		Coms. Precinct 2.	150,000.00
		Justice Precinct 5	100,000.00
		Coms. Precinct 3.	100,000.00
	Tom Green		70,000.00
	Trinity	District No. 1	60,000.00
Virginia	Dickinson	Kenady	30,000.00
	Spottsylvania	Berkley and Livingston	73,000.00
	Stafford		100,000.00
Wisconsin	Columbia		20,000.00
Total			$13,703,948.00

OFFICE OF PUBLIC ROADS OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

The office of road inquiry was established under authority of an act of Congress approved March 3, 1893, making an appropriation of $10,000 to enable the Secretary of Agriculture to make inquiries in regard to systems of road management throughout the United States, investigations in regard to the best methods of road making, to prepare publications on this subject, and assist agricultural colleges and experiment stations in disseminating information. In 1897 the item was amended by authorizing investigation of road making materials in the various States. In 1899 the name of the office was changed from "Road Inquiry" to "Public Road Inquiries." In 1902 the bill was amended so as to provide for investigations of the chemical and physical character of road materials. In 1905 the name of the office was changed to "Office of Public Roads." In the appropriation bill for 1909 the rent or purchase of road making machinery was forbidden. The following is a table of appropriations from the establishment of the office to the fiscal year 1912.

Appropriations from 1893–94 to 1911–12

1893-4	$10,000
1894-5	10,000
1895-6	10,000
1896-7	8,000
1897-8	8,000
1898-9	8,000
1899-1900	8,000
1900-1	14,000
1901-2	20,000
1902-3	30,000
1903-4	35,000
1904-5	$ 35,000
1905-6	50,000
1906-7	70,000
1907-8	70,050
1908-9	87,390
1909-10	116,460
1910-11	114,240
1911-12	160,720
1912-13	202,120
Total	$1,067,080

Since its establishment the office has issued about two hundred publications, including bulletins, circulars, farmer's bulletins, and annual reports, and has directed the construction of upwards of four hundred object lesson and experimental roads, illustrating various methods of construction for the purpose of instructing local road builders, stimulating sentiment for road improvement and introducing adequate types and correct methods of road construction. The office sends out its engineers and experts to give lectures and addresses and to confer with State and local officials on all phases of the road subject. Testing and research laboratories are maintained for the purpose of determining the suitability and relative value of the various materials for road building. A great deal of experimental work is conducted with bituminous and other binders, concrete and various special materials and methods.

In order to secure the engineering and expert advice or supervision from the Office of Public Roads, an application should be made to the director of that office, by the local authorities having jurisdiction over the roads sought to be improved. If it is desired that road materials be tested in the laboratories of the Office of Public Roads, application should be made to the director of that office, for shipping instructions, and blank forms for description of the material. The assistance given by the Office of Public Roads is free to local communities and citizens of the United States, where the object sought is of benefit to the public. The publications of the office may be obtained upon request. The office occupies the entire building at 14th and B Streets S. W., Washington, D. C.

LOGAN WALLER PAGE, *Director.*

ASSOCIATIONS OTHER THAN AMERICAN HIGHWAY ASSOCIATION

Permanent International Association of Road Congresses

Officer.—M. Mahieu, secretary-general, 1 Avenue d'Iena, Paris, France.

1. Object and Organization of the Association

ARTICLE I

The object of the Permanent International Association of Road Congresses is to promote progress in the construction, traffic and exploitation of roads.

It continues the work of the first International Road Congress held in Paris in October, 1908.

It accomplishes its object: 1, By organizing Road Congresses; 2, by publishing papers, proceedings, and other documents; 3, by collecting the results of (*a*) tests carried out on roads; (*b*) laboratory tests throughout the world on materials which are used or are suitable for road construction and maintenance; these tests may be either in the form of mere records collected by the Association or they may have been carried out by the Association itself or through its instrumentality.

Its affairs are managed by a Permanent International Commission.

ARTICLE II

The Association consists of:

1. Delegates of Governments and Corporations of all the countries which subscribe annually to the Association.

2. Private Members.

Membership may be either permanent or temporary.

Governments may appoint one official delegate, with a right to vote at every Congress, for each 250 francs of their annual subsidy.

This amount is reduced to 100 francs for Corporations.

Permanent Members are entitled to attend and vote at every Congress.

Temporary members are entitled to attend the particular Congress they have joined, and they may vote on all questions which do not affect the Permanent Association itself.

3. Honorary Members, nominated by the Permanent International Commission.

ARTICLE III

1. A Permanent International Commission, with headquarters at Paris, is at the head of the Association.

2. A Permanent Council and an Executive Committee are appointed from amongst the Members of this Commission.

ARTICLE IV

The Permanent International Commission is composed of members belonging to the various countries represented in the Association. Each country has the right to one representative for each 1000 francs of its total annual subsidy.

Provided, however, that the number of representatives from any one country shall not exceed 15 (fifteen), and that any country which pays not less than 250 francs shall have the right to appoint one delegate.[1]

American Road Builders' Association

Officers.—Samuel Hill, president, Maryhill, Washington; Harold Parker, first vice-president, Worcester, Massachusetts; W. A. McLean, second vice-president, Toronto, Ontario; Geo. W. Tillson, third vice-president, Brooklyn, N. Y.; E. L. Powers, secretary, New York; W. W. Crosby, treasurer, Baltimore, Maryland.

Headquarters.—No. 150 Nassau Street, New York City.

Objects.—To acquire and disseminate information concerning the best practice in highway construction and maintenance.

To raise the standards of construction.

To emphasize the necessity of careful attention to all details, both of construction and maintenance, and to the selection of such materials as will produce the best results for the amount of money available in each particular case.

To study and compare the organization and the methods of administration, pointing out their relative efficiency in order to secure the best results.

To promote more intelligent interest in and a keener appreciation of the importance of highway construction on the part of administrative officers, engineers and contractors.

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[1] For further information address either the secretary general or the American Highway Association.

To emphasize the necessity of planning an efficient system of highways, as well as the intelligent construction of the individual highway.

American Automobile Association

Officers.—Laurens Enos, president, 621 Main Street, Buffalo, N. Y.; George C. Diehl, chairman good roads board, 575 Ellicott Square, Buffalo, N. Y.; A. G. Batchelder, chairman executive board, 437 Fifth Avenue, New York City.

Headquarters.—437 Fifth Avenue, New York City.

Objects.—To unite in one body all the automobile clubs and individual motorists of the country to secure reasonable and just legislation.

To aid in proper enforcement of automobile laws and ordinances; to advocate and obtain local, State, and Federal aid in the construction and maintenance of good roads.

To encourage touring, and to secure, prepare and disseminate information relative thereto; and

To support sportsmanlike contests and other movements that will advance motoring interests.

American Society of Civil Engineers

Officers.—Geo. F. Swain, president; Charles Warren Hunt, secretary.

Headquarters.—220 West 57th Street, New York.

Purposes so far as they relate to roads.—Investigation and discussion of technical problems of road construction and maintenance.

American Society for Testing Materials.

Officers.—Robert W. Hunt, president, 1121 The Rookery, Chicago, Illinois; Edgar Marburg, secretary-treasurer, University of Pennsylvania, Philadelphia, Pennsylvania.

Committees.—On Standard Specifications for Cement: George F. Swain, chairman, Harvard University, Cambridge, Massachusetts; Richard L. Humphrey, secretary, 805 Harrison Building, Philadelphia, Pennsylvania.

On Standard Specifications for Paving and Building Brick: A. V. Bleininger, chairman, 910 West Nevada Street, Urbana, Illinois; D. E. Douty, general manager, U. S. Conditioning and Testing Company, 340 Hudson Street, New York City.

On Standard Specifications and Tests for Clay and Cement Sewer Pipe: Rudolph Hering, chairman, 170 Broadway, New York; E. J. Fort, secretary, 215 Montague Street, Brooklyn, New York.

On Standard Tests and Specifications for Drain Tile: A. Marston, chairman, Iowa State College, Ames, Iowa.

On Standard Tests for Road Materials: Logan Waller Page, chairman, Office of Public Roads, Washington, D. C.; Prevost Hubbard, secretary, Institute of Industrial Research, Washington, D. C.

National Grange

Officers.—Oliver Wilson, master, Peoria, Illinois; N. P. Hull, lecturer, Dimondale, Michigan; C. M. Freeman, secretary, Tippecanoe City, Ohio. C. S. Stetson, chairman executive committee, Greene, Maine.

One of the Purposes.—The Grange is actively interested in the movement for better roads, particularly the movement for State and national legislation on the subject.

Farmers' Educational and Coöperative Union of America

Officers.—Charles S. Barret, president, Union City, Georgia; J. E. Montgomery, vice-president, Gleason, Tennessee.

Board of Directors.—W. A. Morris, chairman, Sulligent, Alabama; A. C. Shuford, secretary, Newton, North Carolina; S. L. Wilson, Van Vleete, Mississippi; O. F. Dornblaster, Cleburne, Texas; John Grady, Gilbertsville, Kentucky.

Purposes.—While the Farmers' Union is not primarily a road organization it gives effective support to the road movement.

National Association of Rural Letter Carriers

Good Roads Committee.—D. W. Edie, chairman, Gaysville, Vermont.

Purposes.—The Association is giving effective aid to the movement for better roads through its good roads committee.

National Congress of Mothers and Parent-Teacher Association

Headquarters.—806 Loan and Trust Building, Washington, D. C.

The country life department coöperates with local organizations in securing good roads between home and school and bettering opportunities of country children. The United States Department of Agriculture has appointed the following as special agents who may be secured as speakers: Mrs. Frank De Garmo, St. Louis, Missouri; Mrs. Augustus H. Reeve, Moorestown, New Jersey; Mrs. Robert H. Tate, Portland, Oregon; Mrs. E. A. Fairchild is chairman of country life education.

National Highways Association

Officers.—General Coleman du Pont, chairman board of councillors, Wilmington, Delaware; Charles Henry Davis, C.E., president pro tem, New York City, N. Y.; Frederick Remsen Hutton, M.E., Sc.D., general secretary, New York City, N. Y.

Headquarters.—18 Old Slip, New York City, N. Y.

Purposes.—To bring about the building of a system of national highways.

National Highways Protective Society

Officers.—Frederick R. Coudert, president; Edward S. Cornell, secretary; Frederick M. Davies, treasurer.

Headquarters.—1 West 34th Street, New York.

Objects.—To prevent the improper and unreasonable use of the public highways and public roads and places by the owners and users of horses, carriages, bicycles, automobiles, and all other vehicles; to enforce and protect the rights of the members of this corporation and the public in the reasonable and proper use of such public highways, public roads and places, endeavor to secure the construction and maintenance of good roads by public authority; and in furtherance and not in way of limitation upon the objects above enumerated, to endeavor to bring about reasonable and uniform rules and regulations for the use of the public highways, roads and places throughout the United States of America; to aid in the enforcement of the laws in respect thereto, and so far as may be lawful to aid in securing any such changes or modifications thereof as may be found necessary or proper.

National Old Trails Road Association

Officers.—J. M. Lowe, president, Kansas City, Missouri; Harvey M. Shields, general vice-president, Dawson, New Mexico; Colonel Walter Williams, advisory vice-president, Columbia, Missouri; E. S. Ralph, Treasurer, Springfield, Ohio; Frank A. Davis, secretary, Kansas City, Missouri.

Headquarters.—222 Midland Building, Kansas City, Missouri.

Purpose.—To aid and encourage the building of roads particularly national highways and especially the Old Trails road leading from Washington, D. C., to the Pacific Ocean.

Southern Commercial Congress

Officers.—Duncan U. Fletcher, president; David R. Francis, first vice-president; T. S. Southgate, second vice-president; Clarence J. Owens, managing director; William H. Saunders, resident director; Chas. A. Douglas, general counsel.

Headquarters.—Southern Building, Washington, D. C.

Purposes.—Relating to Road improvement. To encourage the movement for the construction of good roads and for the extension of railroad and trolley transportation.

Southern Appalachian Good Roads Association

Officers.—Joseph Hyde Pratt, president; State geologist of North Carolina; vice-presidents: John Craft, Mobile, Alabama; Cyrus Kehr, Knoxville, Tennessee; Peter Lee Atherton, Louisville, Kentucky; Wm. H. Aston, Meadow View, Virginia; Howard Sutherland, Elkins, West Virginia; Prof. C. M. Strahan, Athens, Georgia; Arch. B. Calvert, Spartanburg, South Carolina; E. C. Chambers, Asheville, North Carolina; H. B. Varner, Lexington, North Carolina, secretary; executive committee: S. W. McCallie, Atlanta, Georgia, chairman.

Headquarters.—Chapel Hill, North Carolina.

Purpose.—To encourage the building and maintenance of good roads in the Southern Appalachian States.

Southern National Highway

Officers.—Colonel Dell M. Potter of Clifton, Arizona, president; Colonel Bennehan Cameron of Stagville, North Carolina, general vice-president; Mr. D. R. Ellis of Clifton, Arizona, secretary; and Mr. F. W. Jackson of San Diego, California, treasurer. The vice-presidents for the various States are as follows: Alabama, Mr. W. S. Kellar of Montgomery; South Carolina, Mr. F. H. Hyatt of Columbia; North Carolina, Dr. C. P. Ambler of Asheville; Virginia, Mr. Preston Belvin of Richmond; Kentucky, Mr. James Maret of Mt. Vernon; Tennessee, Cyrus Kehr of Knoxville; Arizona, Mr. Patrick Rose of Globe; and California, Mr. A. S. Spalding of San Diego.

Headquarters.—Clifton, Arizona.

Purpose.—The purpose of the Association is to establish a transcontinental highway from Washington, D. C., to San Diego, California, by a route sufficiently far south to avoid the snows of the Rocky Mountains.

Capital Highway Association

Officers.—Leonard Tufts, president, Pinehurst, N. C.; Allen Potts, vice-president of Virginia, Richmond, Va.; George W. Watts, vice-president of North Carolina, Durham, N. C.; Dr. E. M. Whaley, vice-president of South Carolina, Columbia, S. C.; W. E. Bush, vice-president of Georgia, Augusta, Georgia; Edwin W. Robertson, treasurer, Columbia, S. C.; John R. McQueen, secretary, Pinehurst, N. C.

Purposes.—The object of the Association is to interest the people to build a road from Richmond, Virginia to Atlanta, Georgia, via Raleigh and Columbia and probably passing through Petersburg, Emporia, Henderson and Raleigh, or possibly via Clarksville, Oxford and Durham, from Raleigh the road will probably go via

Fayetteville, Pinehurst, Rockingham, Cheraw, Darlington, Hartsville and Camden to Columbia. From thence to Atlanta via Augusta. The road will be approximately 700 miles long and of this 700 miles the Association has interested the people to build approximately 600 miles so far.

The road from Fayetteville to Atlanta has all been built and for the most part has been fairly well maintained.

Quebec-Miami International Highway Association

Officers.—Howard D. Hadley, president, Plattsburgh, New York; George A. Simard, vice-president, care Franco-American Chemical Company, Montreal, P. Q.; N. M. Parrott, secretary, 763 Calvert Building, Baltimore, Md.

Board of directors are as follows: George A. Simard, Montreal, representing Quebec; Howard D. Hadley, Plattsburgh, representing New York State; Isaac Simonin, Germantown, representing Pennsylvania; Fred F. Smith, Bridgeton, representing New Jersey; Gen. T. Coleman du Pont, Wilmington, representing Delaware; Charles H. Dickey, Baltimore, representing Maryland; Leslie T. McCleary, Willard Hotel, Washington, representing District of Columbia; Preston Belvin, Sr., Richmond, representing Virginia; Col. Bennehan Cameron, Stagville, representing North Carolina; E. J. Watson, Columbia, representing South Carolina; Joseph F. Gray, Savannah, representing Georgia; E. B. Douglass, Miami, representing Florida.

Headquarters.—Plattsburgh, New York (president's office); 763 Calvert Building, Baltimore, Maryland (secretary's office).

Purposes.—To bring about the building of a fine modern highway between Quebec, Canada and Miami, Florida, U. S. A.

To strive for wise, equitable and uniform road legislation in the States through which the "International Highway" is to run.

To advocate the correlation of all road construction so that the important roads of each Province, State and county shall connect with those adjoining, and the important roads of each nation may connect with those of adjoining nations.

To strive for the utilization of convict labor on highways, where that course is consistent with local policy, so as to involve the least possible competition with free labor, the utmost public benefit and a healthy moral and physical development of the convict.

To promote intercourse, peace, trade and friendly relations between Canada and the United States.

The New Santa Fe Trail

Officers.—R. H. Faxon, president, editor *The Evening Telegram,* president Kansas Development Association, chairman Kansas State conservation commission, Garden City, Kansas; J. R. Moorehead, vice-president Missouri Grand Division, Lexington, Missouri; O. M. Wilhite, vice-president Eastern Kansas Grand Division, Emporia, Kansas; E. E. Frizell, vice-president Western Kansas Grand Division, Mayor, Larned, Kansas; R. H. Higgins, vice-president Colorado Grand Division, Pueblo, Colorado; R. E. Twitchell, vice-president New Mexico Grand Division, East Las Vegas, New Mexico; C. H. Scott, secretary-treasurer, Hutchinson, Kansas; H. H. Taylor, official pilot, Hutchinson, Kansas.

Headquarters.—Office *The Evening Telegram*, Garden City, Kansas; office *The Daily News*, Hutchinson, Kansas.

Purposes.—To promote the cause of good roads.

To construct and maintain an interstate highway.

To preserve the history, tradition, and romance of the Old Santa Fé Trail, the first highway of commerce and pioneering in the West.

To bring about wise and useful State roads legislation, as the organization has already done in the State of Kansas.

To project the gospel of, first, federal establishment of transcontinental highways; second, to bring about federal aid, in conjunction and coöperation with the several States.

To bring about definite State supervision of roads; the amendment of State constitutions which at present forbid "work of internal improvement," this organization believing and holding that roadmaking and road supervision are a State function; and to promote as an economical and sociological phase the utilization of convict labor; and to promote the doctrine that the cause of good roads presents the greatest economic, industrial, and social question in the country today.

Omaha-Lincoln-Denver Good Roads Association

Officers.—S. A. Searle, president, Omaha, Nebraska; W. A. Taylor, treasurer, Hastings, Nebraska; G. E. Parisoe, secretary, Minden, Nebraska; A. Barnett, first vice-president, McCook, Nebraska; C. E. Bowlby, second vice-president, Friend, Nebraska.

Inter-Mountain Good Roads Association

Officers.—J. A. Hendrickson, president, Logan, Utah; O. J. Stilwell, secretary-treasurer, Ogden, Utah.

Santa Fe, Grand Canon, Needles, National Highway Association

Officers.—John R. Whiteside, M.D., president, Kingman, Arizona; E. F. Thompson, secretary, Kingman, Arizona; M. I. Powers, Treasurer, Flagstaff, Arizona. Vice-presidents: J. B. Gill, San Bernardino, California; G. D. Hutchinson, Barstow, California; L. V. Root, Needles, California; Carl G. Krook, Kingman, Arizona; E. S. Clark, Prescott, Arizona; J. S. Amundsen, Williams, Arizona; J. G. Verkamp, Flagstaff, Arizona; Harry Asbury, Winslow, Arizona; W. H. Clark, Holbrook, Arizona; Fred T. Colter, Springerville, Arizona; C. N. Cotton, Gallup, New Mexico; Sylvestre Mirabel, San Rafael, New Mexico.

The Travelers Protective Association of America

Officers.—E. B. Smith, national chairman good roads and public utilities committee, Shreveport, Louisiana.

State and Local Organizations

Alabama

Alabama Good Roads Association, John Craft, president, Mobile.
Huntsville Boulevard Club and National Highway, Ben P. Hunt, president, Huntsville.
Baldwin County Good Roads Association, Bay Minette.
Blount County Good Roads Association, Oneonta.
Calhoun County Good Roads Association, W. T. Goodlett, secretary, Jacksonville.
Cherokee County Good Roads Association, Center.
Clarke County Good Roads Association, Grove Hill.
Coffee County Good Roads Association, F. A. Symonds, president, Elba.
Crenshaw County Good Roads Association, Dr. J. R. Horn, president, Luverne.
Dale County Good Roads Association, L. F. Sessions, president, Ozark.
Dallas County Good Roads Association, Clifton Kirkpatrick, president, Cahaba.
Elmore County Good Roads Association, H. H. Golson, secretary, Wetumpka.
Etowah County Good Roads Association, W. P. Archer, president, J. L. Irving, secretary, Gadsden.
Franklin County Good Roads Association, J. Gassier, president, J. C. Norwood, secretary, Russellville.
Houston County Good Roads Association, W. R. Flowers, president, Dothan.
Henry County Good Roads Association, J. R. Ward, president, Abbeville.
Jefferson County Good Roads Association, John W. O'Neill, president, J. A. Rountree, secretary-treasurer, Birmingham.
Pike County Good Roads Association, M. D. Pace, president, Trop.
St. Claire County Good Roads Association, W. S. Forman, president, Ashville, E. E. Kersh, secretary, Odenville.
Talladega County Good Roads Association, A. L. McElderry, president, Talladega.

Arizona

Arizona Good Roads Association, T. G. Norris, president, Prescott.
Mohave County Good Roads Association, Dr. John R. Whiteside, president, Kingman, Arizona.

Arkansas

Arkansas Good Roads and Drainage Association, W. A. Coker, president, Little Rock.

Sharp County Good Roads Association, Thomas J. Wood, president, Evening Shade.

Washington County Good Roads Association, C. E. Pritchard, president, Fayetteville.

California

Contra Costa County Good Roads League, Warren H. McBryde, president, Pinole, W. C. Stewart, secretary, Danville.

Colorado

Arkansas, Rio Grande, Gunnison and Grand River Highway Ass'n., C. R. McLain, president, Canon City.

Central Colorado Highway Association, L. M. Curtis, president, Colorado Springs.

Colorado Good Roads Convention, R. Higgins, president, Pueblo.

Greater Colorado Highway Association, E. E. Sommers, president, Denver.

Lincoln Highway Association of Colorado, Leonard E. Curtis, president, Colorado Springs.

Rocky Mountain Highway Association, Denver.

Arapahoe County Good Roads Association, Littleton.

El Paso County Good Roads Association, Colorado Springs.

Fremont County Good Roads Association, Canon City.

Jefferson County Good Roads Association, Golden.

La Plata County Good Roads Association, Chamber of Commerce, Durango.

Las Animas County Good Roads Association, Trinidad.

Park County Good Roads Association, Fair Play.

Pitkin County Good Roads League, Aspen.

Powers County Good Roads Association, Holly.

Rio Blanco County Good Roads Association, Meeker.

San Juan County Good Roads Association, Chamber of Commerce, Silverton.

Weld County Good Roads Association, Ault.

Connecticut

Redding Protective League, Charles H. Plump, secretary, Redding.

Waterbury Good Roads Association, Inc., George Tracy, president, H. B. Reynolds, secretary, Waterbury.

Florida

State Good Roads Association, William Stinson, president, Jacksonville. A. B. Dunning, secretary, DeLand; J. W. White, treasurer, Jacksonville.

Alachua County Good Roads Association, H. L. Montgomery, president, Miconopy.

Baker County Good Roads Club, C. L. Tabor, secretary, Glen Saint Mary.

Bradford County Good Roads Association, E. L. Odom, president, Lake Butler.

Citrus County Good Roads Association, J. Y. Barnes, president, Lecanto.

Clay County Good Roads Association, V. D. Eddy, president, Green Cove Springs.

Dade County:

- Miami Automobile and Good Roads Association, C. H. Warde, secretary, Miami.

De Soto Good Roads Association, Ed Scott, president, Arcadia.

Duval County Good Roads Committee, Board of Trade, H. H. Richardson, secretary, Jacksonville.

Hamilton County Good Roads Association, C. L. Adams, president, Jasper.

Tampa Board of Trade, Good Roads Committee, Mr. Powell, secretary, Tampa.

Jefferson County Good Roads Association, John Pasco, president, Monticello.

Lake County Good Roads Association, P. A. Ross, president, Eustis.

Lee County Good Roads Association, Dr. M. O. Tarry, president, Fort Myers.

Marion County Good Roads Association, Ed Carmichael, president, Ocala.

Nassau County Good Roads Association, O. L. Vensel, Chairman, Hilliard.

Oasco County Good Roads Association, C. A. Lock, president, Dade City.

Oceola County Good Roads Association, H. C. Stanford, president, Kissimmee.

Orange County Good Roads Association, M. O. Overstreet, president, Orlando.

Palatka County Good Roads Association, Geo. B. Seldon, president, Palatka.

Pinellas County Good Roads Association, C. S. Washington, president, Safety Harbor.

Pinellas County Good Roads Association (St Petersburg Branch) A. W. Fisher, president, St. Petersburg.

Polk County Good Roads Association, E. C. Stewart, president, Bartow.

St. Lucie County Good Roads Association, J. K. Williams, secretary, Ft. Pierce.

Volusia County Good Roads Association, Captain A. B. Dunning, president, Deland.

Georgia

Georgia Federation of Road Authorities, William F. Eve, president, Augusta.

Georgia Good Roads Club, Fred L. White, President, Buckhead.

South Georgia Good Roads Association, L. V. Williams, president; C. F. Andrews, secretary, Waycross.

Central Route Association, Captain H. H. Tift, president, Tifton.

Battlefield Route Association, George A. Veach, president; Adams Park. W. H. Field, secretary, Cartersville.

Georgia-Alabama Good Roads Association, F. C. Lumpkin, president, Eufaula.

North Georgia Good Roads Association, A. N. Tumlin, president, Cave Springs.

Appling County Good Roads Association, W. H. Tilman, president, Surrency.

Ben Hill County Good Roads Club, J. G. Knapp, president, Fitzgerald; F. H. Atkinson, secretary, Fitzgerald.

Berrien County Good Roads Association, Daniel McCraney, president, Sparks.

Brooks County Good Roads Association, H. W. Stubbs, president, Quitman.

Butts County Good Roads Association, S. J. Smith, president, Jackson.

Charlton County Good Roads Association. P. T. Osterman, president, St. George.

Clarke County Good Roads Association, Martin J. Abney, president, Athens.

Clinch County Good Roads Association, J. T. Dame, president, Homerville.

Crawford County Good Roads Association, S. H. Phelan, president, Roberta.

Crisp County Good Roads Association, Cordele.

Dodge County Good Roads Association, Sol Herrman, president, Eastman.

Dooly County Good Roads Association, J. O. Heard, president, Vienna.

Douglas County Good Roads Association, A. S. Gresham, president, Douglasville.
Elbert County Good Roads Association, L. M. Brown, president, Elberton. R. F. D. No. 3.
Fayette County Good Roads Association, A. O. Blolock, president, Fayettsville.
Glasscock County Good Roads Association, Albert Logue, president, Gibson.
Glynn County Good Roads Association, Albert Fendig, president, Brunswick.
Grady County Good Roads Association, W. B. Roddenberg, president, Thomasville.
Greene County Good Roads Club, W. P. McWhorter, president, Woodville; J. C. Williams, secretary, Greensboro.
Habersham County Good Roads Association, Willaim Eberhardt, president; W. S. Irwin, secretary, Clarksville.
Hall County Good Roads Association, J. M. Mundy, president, Gainsville.
Hart County Good Roads Association. L. S. Brown, president, Hartwell. R. F. D. No. 1.
Houston County Good Roads Association, J. L. Fincher, president, Ft. Valley.
Jackson County Good Roads Association, W. C. Davis, president, Commerce
Jeff Davis County Good Roads Association, N. L. Hatton, president, Hazelhurst.
Jefferson County Good Roads Association, W. J. Wrens, president, Wrens.
Liberty County Good Roads Association, Dr. D. W. Baggs, president, Ludowici.
Meriwether County Good Roads Association, J. M. Barnes, president, Bullochville.
Mitchell County Good Roads Association, H. P. Butler, president, Camilla.
Monroe County Good Roads Association, Col. J. O. Persons, president, Forsyth.
Newton County Good Roads Club, L. W. Jarman, president, Porterdale.
Pierce County Good Roads Association, L. W. Root, president, Blacksbear.
Pike County Good Roads Association, W. A. Strickland, president, Concord.
Pulaski County Good Roads Association, T. D. Walker, president, Cochran.
Rabun County Good Roads Association, A. J. Duncan, president, Clayton. R. F. D. No. 1.
Richmond County Good Roads Association, D. C. Haynes, president, Augusta.
Taylor County Good Roads Club, W. E. Steed, president, Butler.
Telfair County Good Roads Association, Captain T. J. Smith, president, McRae.
Tift County Good Roads Association, Captain,H. H. Tift, president; W. E. Farmer, secretary, Tifton.
Thomas County Good Roads Association, James Watt, president, Thomasville.
Turner County Good Roads Association, J. S. Shingler, president, Ashburn.
Upson County Good Roads Association, O. B. Clements, president, Yatesville.
Ware County Good Roads Association, Dr. G. P. Folks, president, Waycross.
Worth County Good Roads Association, T. C. Jeffords, president, Sylvester.
Washington County Good Roads Association, C. H. Shepard, president, Tennille.
Wayne County Good Roads Association, W. J. Broadhurst, president, Jesup.

Idaho

Ada County Good Roads Association, McCready Sykes, secretary, Boise.

Indiana

Northern Indiana Good Roads Association, Aaron Jones, president; C. E. Craybill, secretary, South Bend.
Indiana Letter Carriers' Association, Good Roads Committee, W. J. Ward, chairman, Carmel.
Indiana Federated Commercial Clubs, Good Roads Committee, Ft. Wayne.
Good Roads Association, T. L. Wheeler, secretary, Huntington.
Indiana Good Roads Association, C. A. Keynon, president, Claypool Building, Indianapolis.
Hendricks County:
  Plainfield Improvement League, Dr. Amos Carter, president, Plainfield.
Jefferson County Good Roads Association, John McGregor, president, Madison.
Tippecanoe County:
  Purdue Engineering Club, Lafayette.

Illinois

Illinois Highway Improvement Association, Wm. G. Edens, president; Central Trust Company of Illinois, Richard J. Finnegan, secretary, Lexington Hotel, Chicago.
Waterman Coöperative Good Roads League, Dr. C. H. Wilkenson, president; W. T. Wiltberger, secretary, Waterman.
Effingham County Good Roads Association, A. D. McCallen, president, Effingham.
Effingham Good Roads Club, J. H. Curry, secretary, Effingham.
Henry County:
  Galva Good Roads Improvement Association, John Miller, chairman, Galva.
Jo Daviess County
  Progressive Good Roads Club, Dr. D. G. Smith, president, C. A. Walters, secretary, Elizabeth.
Rock Island County:
  Black Hawk Good Roads Association, D. W. Matthews, president, Milan.
St. Clair County:
  Good Roads Coöperative League, G. G. Bock, president, Smithton.

Iowa

Iowa Good Roads Association, Lafayette Young, president, Des Moines; T. H. MacDonald, secretary-treasurer, Ames.
River Road Association, J. W. Eichinger, secretary, Des Moines.
Iowa State Quarrymen's Association, James W. Burroughs, secretary, Marshalltown.

Kansas

Kansas State Good Roads Association, H. G. James, president, Independence; W. S. Gearhart, secretary-treasurer, Manhattan.
Kansas Engineering Society, R. V. Leeson, president, Topeka; T. J. Strickler, secretary, Topeka.

Topeka-Shawnee Good Roads Association, Clarence Skinner, secretary-treasurer, Topeka.

Golden Belt Road Association, G. E. Munzenmayer, president, Junction City; B. W. Smith, secretary, Manhattan.

Meridian Road Association, W. W. Watson, president, Salina; John C. Nicholson, secretary, Newton.

Old Sante Fe Trail Association, Frank A. Davis ,secretary, Herington.

The Sunflower Trail, R. M. Anderson, president; Dr. C. B. Kern, secretary, Beloit.

Tri-State Trail Association, H. O. Douglas, president, Oberlin; Charles Sawyer, secretary, Norton.

Cloud County Good Roads Association, P. G. Harmon, secretary-treasurer, Concordia.

Geary County Good Roads Association, Dr. W. S. Yates, president, O. E. Hutchings, secretary-treasurer, Junction City.

Graham County Good Roads Association, William Burns, president, Bogue. D. C. Green, secretary, Hill City.

Montgomery County Good Roads Association, H. G. James, president, Independence; Sam L. McMurtry, secretary, Coffeyville.

Cherryvale Good Roads Association, H. M. Casebeer, president; F. B. Moffett, secretary-treasurer, Cherryvale.

Manhattan Motor Club (in Riley County), Dr. J. D. Colt, president; B. W. Smith, secretary, Manhattan, Kansas.

The Garden City Motor Club (in Finney County), A. R. Clark, president, Garden City; R. H. Faxon, secretary, Wichita, Kansas.

Washington County Good Roads Association, A. E. McGregor, president, Washington, Kansas; Joe Smith, secretary, Washington, Kansas.

Kentucky

Boone Way Booster Band, U. G. Baker, president, Mt. Vernon; James Maret, secretary-treasurer, Mt. Vernon.

Kentucky Good Roads Association, Joseph Bosworth, president, Middlesboro.

Southeastern Kentucky Good Roads Association, N. R. Patterson, president; Miss Lena Rollins, secretary, Pineville.

Kenton County Good Roads Association, W. L. White, secretary, R. F. D. No. 1, Latonia.

Louisiana

Baton Rouge-New Orleans Good Roads Association, F. B. McQuesty, secretary, Baton Rouge.

Acadia Parish Good Roads Association, H. E. Lewis, president, Crowley.

Calcasieu Parish Good Roads Association, Dr. J. W. Ways, president, Kinder.

Iberia Parish Good Roads Association, Dr. Guy Shaw, president, Loreanville.

St. Landry Parish Good Roads Association, James O. Chachere, president, Opelonsas.

Maine

Aroostook County Good Roads Association, Howard W. Safford, president, Mars Hill; Michael M. Clark, secretary, Houlton.

Kennebunk Good Roads Association, Dr. Frank M. Ross, president; Frank W. Bowser, secretary, Kennebunk.

Maryland

Interstate Good Roads Association, Chas E. Shelton, superintendent, Mountain Lake Park.
Baltimore County Good Roads Association, Frank Shipley, president, Gwynnbrook; W. H. McAllister, secretary, Hamilton.

Massachusetts

Massachusetts Highway Association, John M. McCarthy, secretary, 15 Ashburton Place, Boston.

Michigan

Michigan Good Roads Association, Philip T. Colgrove, president, Hastings, A. A. Anderson, secretary, Hastings.
Michigan Trunk Line Highway, Association, George Hartrigh, president, Pinconing, Michigan.
Berrien County Good Roads Association, J. M. Ball, president; J. W. Allen, secretary, St. Joseph.
Houghton County Good Roads Association, Hancock.
Montcalm County Good Roads Association, M. W. Stevenson, president, D. A. Towle, secretary, Stanton.
Wexford County Good Roads Association, E. B. Kelly, president, Cadillac; T. H. Myers, secretary, Manton.

Minnesota

Minnesota Roadmakers Association, J. H. Mullen, secretary, St. Paul.
Aitkin Development Association, Mr. Warner, president, Aitkin.
Carlton County Development Association, Carlton.
Elysian Good Roads Association, C. Cologan, president, Elysian.
Janesville Good Roads Association, Mr. Bardon, president, Janesville.
LeSueur Good Roads Association, Oscar Swenson, president, LeSueur.
Lonsdale Good Roads Association, A. J. Smisek, president, Lonsdale
Madelia Commercial Club, Madelia.
New Prague Good Roads Association, J. F. Wrabek, secretary, New Prague.
New Richland Good Roads Association, M. A. Hodgkins, New Richland.
Nicollet County Good Roads Association, A. J. Potts, president, Nicollet.
Northern Development Association, C. A. Albright, president, Crow Wing.
St. James Commercial Club, C. T. Crowley, president, St. James.
Scott County Good Roads Association, J. H. Moore, president, Jordan.
Springfield Good Roads and Development Association, Springfield.
Waseca Good Roads Association, Doctor Blanchard, Waseca.

Mississippi

Gulf Coast Good Road. Association, M. P. Bouslog, secretary, Gulfport.
Good Roads Committee, E. H. Babbitt, secretary, Okolona.
Oktibbeha County Good Roads Association, J. W. Eckford, secretary, Starkville.
Panola County Good Roads Association, C. Q. Moore, chairman, Sardis.

Missouri

Missouri Good Roads Associations, E. E. E. McJimsey, president, Springfield.
Missouri Association of County Judges, G. W. Pine, president, Palmyra; Curtis Hill, secretary, Columbia.

Highway Engineers' Association of Missouri, L. M. Stallard, president, St. Joseph; J. F. Warner, secretary, Benton.

Westline Good Roads Association, G. W. Stark, secretary, Westline.

Nevada Good Roads Club, R. A. Buckner, president, Nevada; J. M.Clack, secretary, Nevada.

Olivette-Stratman Improvement Association, M. B. Greensfelder, president, Clayton; H. H. Elbring, secretary, Clayton.

The Brotherhood of Good Road Draggers, G. W. Batterton, president, Sturgeon; Omar D. Gray, secretary, Sturgeon.

365-Day Road Club, J. D. Clarkson, president, Carthage; Chas. A. Blair, secretary, Carthage.

Chariton Township Good Roads Association, Owen Harrison, president, Glasgow; E. W. Price, secretary, Glasgow.

Good Roads Association of St. Clair, Franklin County, Dr. C. E. Briegleb, president, St. Clair; Dr. W. E. Kitchell, secretary, St. Clair.

St. Louis County Highway and Waterway Association, Gottlieb Bayer, president, Chesterfield; Fred Mueller, secretary, Clayton.

Barry County Good Roads Association, J. F. Mermoud, president, Monett; Bert Robbins, secretary, Cassville.

Perry County Good Roads Association, Robert H. Hudson, president, St. Marys; J. F. DeLassus, secretary, Crosstown.

Davies County Good Roads Association, Geo. A. Iddings, president, Pattonsburg, R. R. 4; Harvey B. Miller, secretary, Gallatin.

Barton County Good Roads Association, W. J. Evilsizer, president, Lamar; Jas. Graham, secretary and treasurer, Lamar.

Short Line Route Association, M. H. Hall, president, Tarkio; F. S. Traveis, secretary, Tarkio.

St. Joe-Des Moines Interstate Trail Association, W. A. Hopkins, president, Lamoni, Iowa; Daniel Anderson, secretary, Lamoni, Iowa.

Cannon Ball Trail Association, Jas. R. Bowsher, president, Leon, Iowa; Chas. D. Davis, secretary, Princeton.

St. Joe-Des Moines Ayr Line Association, A. I. Smith, president, Mt. Ayr, Iowa; H. C. Beard, secretary, Mt. Ayr, Iowa.

Sedalia-Springfield Highway Association, W. S. Jackson, president, Warsaw; M. V. Carroll, secretary, Sedalia.

Old Trails Road Association, Walter Williams, president, Columbia; E. H. Mitchell, secretary, Marshall.

Capitol Route State Highway Association, J. H. Bothwell, president, Sedalia; M. V. Carroll, secretary.

North Missouri Cross State Highway Association, George Robertson, president, Mexico; John F. Morton, secretary, Richmond.

Missouri Highway Association, Ray F. Britton, president, St. Louis; J. B. Grigg, secretary, Joplin.

The Capital Trail Association, John W. Bingham, president, Milan; A. B. Pratt, secretary, Unionville.

Western Missouri Good Roads Association, Bud. M. Robinson, president, Joplin; J. B. Grigg, secretary, Joplin.

Montana

Montana Good Roads Congress, E. P. Mathewson, president, Anaconda.

Committee on State Roads Project, Montana Society of Engineers, Clinton H. Moore, secretary, Butte.

Nebraska

Meridian Road Association, Charles Baugh, secretary, York; R. L. Castile, Secretary, Stromsburg; F. O. Edgecomb, secretary, Geneva; G. W. Phillips, Secretary, Columbus; M. C. Garrett, secretary, Madison; A. Koyen, secretary, Norfolk.

Boone County Good Roads Association, D. J. Poynter, secretary, Albion.
Butler County Good Roads Association, Guy Walling, secretary, David City.
Colfax County Good Roads Association, J. E. McNabb, secretary, Schuyler.
Dodge County Good Roads Association, George F. Staata, secretary. Fremont.
Douglas County Good Roads Association, W. J. Kirkland, secretary, Omaha.
Howard County Good Roads Association, A. L. Baliman, secretary, St. Paul.
Lancaster County Good Roads Association, Fred C. Fiske, secretary, Lincoln.
Madison County Good Roads Association, C. B. Salter, secretary, Madison.
Nance County Good Roads Association, J. D. Barnes, secretary, Fullerton.

New Jersey

New Jersey Association of County Engineers, Joshua Doughty, Jr., president, Somerville; E. E. Reed, secretary, Trenton.

New Mexico

New Mexico Good Roads Association, R. E. Twitchell, president, East Las Vegas.
Ocean to Ocean Highway Association, R. E. Twitchell, vice-president, East Las Vegas.
Dona Ana County Good Roads Association, F. E. Lester, president, Las Cruces.
Lincoln County Good Roads Association, J. W. Laws, chairman, Lincoln.
Albuquerque Good Roads Association, E. C. Butler, president.
Las Vegas Good Roads Association, David J. Leahy, president, East Las Vegas.
Raton Good Roads Association, L. S. Wilson, president, Raton.
Colfax County Good Roads Association, Dr. L. L. Cahill, president, Springer.
Socorro County Good Roads Association, J. S. MacTavish, president, Magdalena.
Santa Fe Good Roads Association, John R. McFie, president, Santa Fe.

New York

New York State Road Builders Association, E. H. Van Hoesen, secretary, 25 North Pearl Street, Albany.
Monroe County:
    Phillipstown Good Roads Association, Henry Metcalf, secretary, Cold Springs.

North Carolina

Central Highway Committee, H. B. Varner, chairman, Lexington.
Charlotte-Wilmington Highway Association, A. D. Skelding, secretary, Charlotte.
North Carolina Good Roads Association, Joseph H. Pratt, secretary, Chapel Hill.
Anson County Good Roads Association, Dr. W. J. McLendon, president, Wadesboro.
Ashe County Good Roads Association, P. E. Fogle, president, Beaver Creek; W. E. Johnson, secretary, Beaver Creek.
Beaufort County Good Roads Association, George T. Leach, president, Washington; C. L. Morton, secretary-treasurer, Washington.

Bladen County Good Roads Association, O. L. Clark, president, Clarkton, W. J. Davis, secretary, Elizabethtown.

Asheville and Buncombe County Good Roads Association, E. C. Chambers, president, Asheville; B. M. Jones, secretary-treasurer, Asheville.

Burke County Good Roads Association, J. E. Erwin, president, Morganton.

Bridgewater Township Good Roads Association, W. Lyerly, president, Bridgewater; R. A. Abernathy, secretary-treasurer, Bridgewater.

Connelly Springs Township Good Roads Association, Allis Coulter, president, Connelly Springs; J. L. Sides, secretary-treasurer, Connelly Springs.

Glen Alpine Township Good Roads Association, Dr. E. A. Hennessee, president, Glen Alpine; J. H. Giles, secretary-treasurer, Glen Alpine.

Hildebran Township Good Roads Association, J. W. Beach, president, Hildebran; A. L. Yoder, secretary-treasurer, Hildebran.

Little River Township Good Roads Association, J. F. Steele, president, Lenoir; F. M. Whitner, secretary, Lenoir.

Camden County Good Roads Association, P. W. Stevens, president, Shiloh; E. I. Sawyer, secretary-treasurer, Camden.

Carteret County Good Roads Association, C. S. Wallace, president, Morehead City; M. L. Willis, secretary-treasurer, Morehead City.

Catawba County Good Roads Association, R. L. Shuford, president, Newton; R. P. Caldwell, secretary, Newton.

Chatham County Good Roads Association, James B. Atwater, president, Bynum; Frank D. Jones, secretary-treasurer, Gulf.

Chowan County Good Roads Association, J. H. McMullan, Jr., president, Edenton; H. L. Story, secretary-treasurer, Edenton.

Columbus County Good Roads Association, G. Herbert Smith, president, Acme; K. Clyde Council, secretary, Wananish.

Craven County Good Roads Association, R. A. Nunn, president, New Bern; W. G. Boyd, secretary, New Bern.

Cumberland County Good Roads Association, T. G. McAlister, president Fayetteville; W. M. Walker, secretary-treasurer, Fayetteville.

Currituck County Good Roads Association, H. C. Hosier, president, Moyock; E. R. Johnson, secretary-treasurer, Currituck.

Davidson County Agricultural and Good Roads Association, W. C. Wilson, president, Lexington; A. L. Leonard, secretary-treasurer, Lexington.

Abbotts Creek Good Roads and Agricultural Association, C. D. Motsinger, president, Winston-Salem; C. H. Teague, secretary, Wallburg.

Arcadia Good Roads and Agricultural Association, J. E. Hill, president, Lexington; C. A. Kimel, secretary, Clemmons.

Alleghany Good Roads and Agricultural Association, Robert Stokes, president, Newson; J. L. Doby, secretary, Newson.

Boone County Good Roads and Agricultural Association, W. B. Mears, Linwood.

Cotton Grove Good Roads and Agricultural Association, J. D. Lockabill, president, Southmont; John L. Miller, secretary, Linwood.

Denton Good Roads and Agricultural Association, Rev. Jefferson Lanning, president, Denton; J. M. Daniel, secretary, Denton.

Cid Good Roads and Agricultural Association, N. H. Prevo, president, Cid; D. A. Leach, secretary, Denton.

Hampton Good Roads and Agricultural Association, John W. Hampton, president, Clemmons; J. L. Nelson, secretary, Clemmons.

Healing Springs Good Roads and Agricultural Association, James I. Smith, president, Silver Hill; Hurley Daniel, secretary, Denton.

Holly Grove Good Roads and Agricultural Association, C. A. Swink, president, Lexington; James F. Deal, secretary-treasurer, Lexington.

Jackson Hill Good Roads and Agricultural Association, Stokes Smith, president, Newson; C. L. Badgett, secretary, Jackson Hill.

Liberty Good Roads and Agricultural Association, T. G. Kindley, president, Lexington; John W. May, secretary, Hannersville.

Midway Good Roads and Agricultural Association, C. Frank Lindsay, president, Wallburg; P. E. Whicker, secretary, Winston-Salem.

Reedy Creek Good Roads and Agricultural Association, P. E. Fritts, president, Lexington; J. A. Hedrick, secretary, Lexington.

Silver Hill Good Roads and Agricultural Association, Joe Hedrick, president, Silver Hill; Grover C. Palmer, secretary, Silver Hill.

Thomasville Good Roads and Agricultural Association, S. H. Averett, president, Thomasville; L. E. Bird, secretary, Thomasville.

Tyro Good Roads and Agricultural Association, N. H. Swicegood, president, Lexington; Charles F. Koontz, secretary, Linwood.

Davie County Good Roads Association, T. J. Byerly, president, Mocksville; C. F. Stroud, secretary, Mocksville.

Island Creek Township Good Roads Association, George R. Ward, president, Wallace; W. B. Brice, secretary-treasurer, Wallace.

Durham County Good Roads Association, Dr. A. Cheatham, president, Durham; P. C. Graham, secretary-treasurer, Durham.

Forsyth County Good Roads Association; Judge H. R. Starbuck, president, Winston-Salem; A. F. Yarborough, vice-president, Winston-Salem.

Gates County Good Roads Association, Lycurgus Hofler, president, Gatesville; S. P. Cross, secretary-treasurer, Gatesville.

Granville County Good Roads Association, T. G. Currin, president, Oxford; R. P. Coble, secretary-treasurer, Oxford.

Greene County Good Roads Association, E. D. Little, president, Snow Hill; J. E. Debnam, secretary-treasurer, Snow Hill.

Guilford County Good Roads Association, J. Van Lindley, president, Greensboro; S. L. Trogden, secretary-treasurer, Greensboro.

Halifax County Good Roads Association, John L. Patterson, president, Roanoke Rapids; Charles J. Shields, secretary-treasurer, Scotland Neck.

Harnett County Good Roads Association, Dr. J. W. Halford, chairman, Chalybeate Springs; C. D. McNeely, secretary, Chalybeate Springs.

Haywood County Good Roads Association, F. W. Miller, president, Waynesville; James Atkins, secretary-treasurer, Waynesville.

Hertford County Good Roads Association, A. C. Vann, president, Ahoskie; W. A. Thomas, secretary, Cofield.

Johnston County Good Roads Association, W. M. Sanders, president, Smithfield; C. M. Wilson, secretary-treasurer, Wilsons Mills.

Benson Township Good Roads Association, P. B. Johnson, president, Benson; R. F. Smith, secretary-treasurer, Benson.

Jones County Good Roads Association, R. L. May, chairman, Trenton; John R. Barker, secretary-treasurer, Trenton.

Lee County Good Roads Association, J. B. Watson, president, Jonesboro; T. S. Cross, secretary, Sanford.

Lenoir County Good Roads Association, Dr. J. M. Parrott, president, Kinston; Rev. C. W. Howard, secretary-treasurer, Kinston.

Lincoln County Good Roads Association, W. C. Kiser, president, Lincolnton; M. H. Groves, secretary, Lincolnton.

Old Fort Township Good Roads Association, Dr. F. H. Ihne, Graphiteville.

Macon County Good Roads Association, T. M. Green, president, Franklin.

Madison County Good Roads Association, Jasper Ebbs, president, Spring Creek; Dudley Chipley, secretary-treasurer, Marshall.

Hot Springs Township Good Roads Association, N. J. Lance, president, Hot Springs; S. W. Brown, secretary, Hot Springs.

Martin County Good Roads Association, W. C. Manning, president, Williamston; C. H. Godwin, secretary-treasurer, Williamston.

Mecklenburg County Good Roads Association, F. M. Shannonhouse, secretary, Charlotte.

Mitchell County Good Roads Association, George K. Pritchard, chairman, Bakersville; W. C. Berry, secretary, Bakersville.

Montgomery County Good Roads Association, Frank Page, president, Biscoe; O. B. Deaton, secretary-treasurer, Troy.

Moore County Good Roads Association, Leonard Tufts, president, Pinehurst; J. R. McQueen, secretary-treasurer, Pinehurst.

Northampton County Good Roads Association, John E. Moore, president, Jackson; A. J. Connor, secretary-treasurer, Rich Square.

Orange County Good Roads Association, Frank Nash, president, Hillsboro; T. Wingate Andrews, secretary-treasurer, Hillsboro.

Pasquotank Good Roads Association, W. J. Williams, president, Elizabeth City; C. R. Little, secretary-treasurer, Elizabeth City.

Pender County Good Roads Association; George J. Moore, president, Atkinson; Laughlin McNeill, secretary-treasurer, Burgaw.

Perquimans County Good Roads Association, T. F. Winslow, president, Hertford; W. B. Hudson, secretary-treasurer, Hertford.

Person County Good Roads Association, W. E. Morton, president, Roxboro; J. W. Noell, secretary, Roxboro.

Pitt County Good Roads Association, R. R. Cotten, president, Bruce; H. A. White, secretary-treasurer, Greenville.

Randolph County Good Roads Association, J. E. Williamson, president, Worthville; Seth W. Laughlin, secretary-treasurer, Asheboro.

Richmond County Good Roads Association, W. J. Everett, president, Rockingham; B. F. Reynolds, secretary-treasurer, Rockingham.

Robeson County Good Roads Association, A. E. White, secretary-treasurer, Lumberton.

Rockingham County Good Roads Association, J. P. Richardson, president, Reidsville.

Rowan County Good Roads Association, P. B. Beard, president, Salisbury; J. H. Warburton, secretary, Salisbury.

Gold Hill Township Good Roads Association, J. W. Peeler, president, Rockwell.

Rutherford County Good Roads Association, Dr. John C. Twitty, president, Rutherfordton.

Surry County Good Roads Association, M. F. Butner, Secretary, Pinnacle.

Tyrrell County Good Roads Association, F. L. W. Cahoon, president, Columbia; H. S. Swain, secretary-treasurer, Jerry.

Union County Good Roads Association, W. C. Heath, president, Monroe; W. B. Love, secretary, Monroe.

Wake County Good Roads Association, Dr. J. M. Templeton, president, Cary; Col. Edward E. Britton, secretary-treasurer, Raleigh,

Washington County Good Roads Association, T. W. Blount, president, Roper; W. M. Bateman, Secretary-treasurer, Plymouth.

Wayne County Good Roads Association, George C. Royall, president, Goldsboro; G. A. Norwood, secretary-treasurer, Goldsboro.

Wilkes County Good Roads Association, H. W. Horton, president, North Wilkesboro; Bruce Craven, secretary-treasurer, North Wilkesboro.

Yadkin County Good Roads Association, F. W. Hanes, chairman, Yadkinville; W. E. Rutledge, secretary, Yadkinville.

North Dakota

North Dakota Highway Improvement Association, W. W. Smith, president, Fargo; Thos. P. Cooper, secretary, Fargo.

Ohio

Ohio Good Roads Federation, Jesse Taylor, president, Jamestown; H. K. Laird, secretary, 515 Hartman Building, Columbus.

Columbiana County Good Roads Association, J. H. French, president, Salem; Russell Heddersten, secretary, East Liverpool.

Franklin County Good Roads Association, E. A. Peters, president, Groveport; William H. Maize, secretary, 406 Harrison Building, Columbus.

Greene County Good Roads Association, H. N. Ensign, president, Jamestown; R. S. Dean, secretary, R. F. D., Xenia.

Hardin County Good Roads Association, L. X. Bixler, president, Kenton.

Knox County Good Roads Association, H. C. Devine, president; W. G. Rimer, secretary, Mount Vernon.

Monroe County Good Roads Association, L. E. Matz, president, Woodsfield.

Preble County Good Roads Association, C. W. Bloom, president; C. G. Hawley, secretary, New Paris.

Putnam County Good Roads Association, B. F. Sietz, president, Columbus; A. M. Heidlebaugh, secretary, Ottawa.

Scioto County Good Roads Association, L. Taylor, president, Rarden.

Portage County Improvement Association, D. R. Hanna, president; Chas. R. Sharp, secretary, Ravenna.

Washington County Roads Association, N. N. Thorniley, president; J. H. Deval, secretary, Marietta.

Wayne County Good Roads Association, Hon. Ed. S. Wertz, Wooster.

Williams County:

Automobile and Good Roads Association, William Behne, secretary, Bryan.

Williams County Good Roads Association, Frank Dolph, president, West Unity; C. C. Lloyd, secretary, Montpelier.

Oklahoma

Oklahoma State Good Roads Association, W. R. Goit, president; C. C. Hudson, secretary, Oklahoma City.

Oregon

Oregon Association for Highway Improvement, Philip S. Bates, secretary, 215 Oregonian Building, Portland.

Pennsylvania

Good Roads Advocate Association, Walter R. Markley, secretary, Lancaster.

Good Roads Association, W. G. Triebly, Ashland.

Road Tax-Payers Association, J. G. Eckert, secretary, Drifton.

Armstrong County Road Supervisors' Association, John T. Deemer, secretary, Kittanning.

Bucks County Road Supervisors' Association, J. Hibbs Buckman, secretary, Eden.

Cambria County:

Executive Committee, Road Improvement Commission, W. W. Bailey, chairman, Johnstown.

Chester County Road Supervisors' Association, Elwood C. Cox, secretary, Kennett Square.

Crawford County Road Supervisors'Association, G. Beatty, secretary, Meadville.

Erie County Road Supervisors' Association, H. G. Havens, secretary, R. F. D. No. 4, Erie.
Fayette County Good Roads Association, Ernest H. Rowe, secretary, Uniontown.
Indiana County Good Roads Association, Joe J. Campbell, secretary, R. F. D. Homer City.
Lycoming County Good Roads Association, Ralph Gibson, secretary, Williamsport.
Monroe County Good Roads Association, Norman Huffman, secretary, Stroudsburg.
Montgomery County Road Supervisors' Association, J. B. Krause, secretary, Sanatoga.
Potter County Road Supervisors'Association, R. R. Tunis, secretary, Coudersport.
Tioga County Road Supervisors' Association, J. A. Reese, secretary, Wellsboro.
Venango County Road Supervisors' Association, Richard Kounerdell, secretary, Franklin.
Wayne County Road Supervisors' Association, Bert S. Hull, secretary, Waymart.
Westmoreland County Good Roads Association, Crombie Allen, secretary, Greensburg.
Wyoming County Road Supervisors' Association, J. E. Pearson, secretary, Shinners Eddy.

Rhode Island

League of Improvement Societies in Rhode Island, Committee on Highways, Nathan T. Bacon, Peacedale, Herbert J. Wells, Providence: William L. Hodgeman, Providence, George L. Crocker, secretary of Committee, Providence.

South Carolina

South Carolina Good Roads Association, Fingal C. Black, secretary, Columbia.
Abbeville County Good Roads Association, Dr. C. C. Cambrell, president, Abbeville.
Aiken County Good Roads Association, J. T. Shuley, president, Aiken.
Anderson County Good Roads Association, W. L. Brissey, president, Anderson.
Barnwell County Good Roads Association, W. Z. Bryan, president, Allendale.
Bamberg County Good Roads Association, S. G. Mayfield, president, Bamberg.
Calhoun County Good Roads Association, J. M. Moss, president, St. Matthew.
Charleston County Good Roads Association, J. M. Connelly, president, Charleston.
Cherokee County Good Roads Association, T. B. Butler, president, Gaffney.
Chester County Good Roads Association, John R. Alexander, president, Chester.
Dorchester County Good Roads Association, John A. Hiers, president, St. George.
Edgefield County Good Roads Association, S. B. Mayers, president, Edgerfield.
Greenwood County Good Roads Association, W. L. Anderson, president, Hodges.
Kershaw County Good Roads Association, W. C. West, president, Camden.

Lancaster County Good Roads Association, W. U. Clyburn, president, Kershaw.

Marion County:

Road and Highway Commission, L. D. Lide, clerk, Marion.

Newberry County Good Roads Association, Dr. W. C. Brown, president, R. F. D. Newberry.

Oconee County Good Roads Association, A. P. Crisp, president, Walhalla.

Orange County Good Roads Association, F. J. D. Felder, president, Orangeburg.

Pickens County Good Roads Association, W. T. O'Dell, president, Liberty.

Spartanburg County Good Roads Association, S. T. D. Lancaster, president, Pauline.

Sumter County Good Roads Association, S. A. Harvin, president, Sumter.

Union County Good Roads Association, J. H. Spears, president, Union.

York County Good Roads Association, R. T. Fewell, president, Rock Hill.

Williamsburg County:

Good Roads Commission, J. A. Kelly, president, Kingstree.

South Dakota

South Dakota Good Roads Association, J. W. Parmley, president, Ipswich.

Brown County Public Improvement Club, W. B. Miller, secretary, Groton.

Hutchinson County Meridian Road Club, A. J. Waltner, secretary, Freeman.

Roberts County Good Roads Association, S. E. Oscarson, secretary, White Rock.

Meridian Road Committee, Henry S. Morris, chairman, Sisseton.

Tennessee

East Tennessee Good Roads Association, Henry R. Brown, president, Greenville.

Western Tennessee Good Roads and Drainage Association, J. D. Johnson, president, Henderson.

Memphis-Bristol Highway Association, George A. Gowan, president, 1201 Woodland Street; C. C. Gilbert, secretary, Stahlman Building, Nashville.

Anderson County Good Roads Association, W. L. Owen, president, Clinton.

Bradley County Good Roads Association, J. W. Beard, president, Cleveland.

Fayette County Good Roads Association, E. A. Maddox, president, Somerville.

Grainger County Good Roads Association, A. E. Foster, president, Lea Springs.

Knox County Good Roads and Park Association, Cyrus Kehr, president, 607 Empire Building, Knoxville.

Loudon County Good Roads Association, J. W. Norwood, president, Martel.

McMinn County Good Roads Association, R. J. Fisher, president, Athens.

Madison County Good Roads Committee, R. A. Hurt, secretary, Jackson.

Monroe County Good Roads Association, C. F. Latimer, president, Madisonville.

Roane County Good Roads Association, W. C. Shaw, president, Harriman.

Texas

Texas Good Roads Association, G. W. Baker, secretary, Dallas.

Texas Industrial Congress, Henry Exall, president; W. C. Barrickman, secretary, Dallas.

Gulf Coast Good Roads Association, J. H. Hawley, secretary-manager, Galveston.

Alvin Good Roads Association, E. L. Long, secretary, Alvin.

Brazoria County Good Roads Association, W. C. Stockton, president, Angleton.

Brazos County Good Roads Club, L. M. Hewitt, secretary, Bryan.

Brown County Good Roads Club, D. F. Johnson, secretary, Brownwood.

Calhoun County Good Roads Association, J. J. Frick, president, Sea Drift.

Cameron County Good Roads Association, E. A. McGary, president, Brownsville.

Eagle Lake Good Roads Club, T. L. Smith, secretary, Eagle Lake.

Dallas County Good Roads Club, J. F. Zang, president, Dallas.

Dimmitt County Good Roads Club, R. B. White, president, Carrizo Springs.

Fall County Good Roads Club, G. H. Carter, president, Marlin.

Fannin County Good Roads Club, F. M. Gibson, president, Bonham.

Franklin County Good Roads Association, F. S. Estes, secretary, Franklin.

Grayson County:

  Denison Good Roads Club, J. M. Madden, president, Denison.

Hidalgo County Good Roads Association, Mr. Cunningham, president, Mission.

Hopkins County Good Roads Club, F. W. Mack, secretary, Sulphur Springs.

Hunt County Good Roads Club, Greenville.

Beaumont and Jefferson County Good Roads Association, Sam Park, president, Beaumont.

Jefferson County Good Roads Club, T. W. Larkin, secretary, Beaumont.

Kerr County Good Roads Club, Arthur Beal, president, Kerrville.

Lamar County Good Roads Association, T. J. Record, president, Paris.

Paris Good Roads Club, W. H. Ragland, secretary, Paris.

Matagorda County Good Roads Association, S. H. Smith, president, Blessing.

Newton County Good Roads Association, Prof. A. B. Alford, president, Burkeville.

Nueces County Good Roads Association, W. H. McCracken, president, Kingsville.

Orange County Good Roads Association, Geo. W. Bancroft, president, Orange.

Refugio County Good Roads Association, L. J. Winters, president, Woodsboro.

San Patricio County Good Roads Association, J. T. Mahenny, president, Matthews.

Virginia

Virginia Road Builders Association, S. H. Fletcher, president, Lebanon.

Amelia County Good Roads Association, H. F. Green, president, Amelia.

Culpeper County Good Roads Association, W. R. Pleak, president, Culpeper.

Campbell County Good Roads Association, W. L. Garbee, president, Lawyer.

Charlotte County Good Roads Association, B. P. Eggleston, president, Charlotte.

Chesterfield County Good Roads Association, Howard Swineford, president, Richmond.

Dinwiddie County Good Roads Association, J. E. Perkinson, chairman, Dinwiddie.

Franklin County Good Roads Association, John B. Sanders, president, Rocky Mount.

Fauquier County Good Roads Association, O. T. Crosby, president, Warrenton.

Henry County Good Roads Association, J. R. Gregory, president, Martinsburg.

Halifax County Good Roads Association, W. Holt Edwards, president, Houston.

King William County Good Roads Association, Chas M. Brown, president, Sweet Hall.

Lunenburg County Good Roads Association, E. P. Wallace, president, R. F. D., Meherrin.

Mecklenburg County Good Roads Association, Lucius Gregory, president, Chase City.

Nansemond County Good Roads Association, R. H. Beamon. president, Beamon.

Nelson County Good Roads Association, Major W. M. Boyd, president, Arrington.

Nottoway County Good Roads Association, T. M. Dillard, president, Blackstone.

New Kent County Good Roads Association, W. J. Wallace, president, Tunstall.

Orange County Good Roads Association, C. C. Taliaferro, president Orange.

Prince William County Good Roads Association, C. A. Heinekin, president, Haymarket.

Pittsylvania County Good Roads Association, J. L. Carter, president, Chatham.

Patrick County Good Roads Association, Dr. R. S. Martin, president, Stuart.

Prince Edward County Good Roads Association, Dr. Wm. M. Holladay, president, Hampden Sidney.

Southampton County:
- Community Fair Association, T. B. Henderson, secretary, Boykins.

Spotsylvania County:
- Fredericksburg Good Roads Association, E. D. Cole, president; Thomas H. Harris, treasurer, Fredericksburg.

Shenandoah County Good Roads Association, M. H. Bowman, president, Woodstock.

Warren County Good Roads Association, N. S. Waller, president, Front Royal.

Wise County Good Roads Association, John W. Chalkley, president, Big Stone Gap.

Washington

Washington State Good Roads Association, John A. Rea, secretary, Tacoma.

Country Life Commission, Edwin A. Smith, secretary, Spokane.

Pacific County Good Roads Association, T. H. Dixon, secretary, South Bend.

Pierce County:
- Long Branch Good Roads Improvement Association, Samuel S. Watkins, secretary, Long Branch.

Spokane County Good Roads Association, Frank M. Guilbert, vice-president and secretary, Spokane.

West Virginia

West Virginia Road Engineers' Society, W. J. Alexander, president, New Martinsville.

Good Roads Committee, West Virginia Board of Trade, Howard Sutherland, chairman, Elkins.

Harrison County Good Roads Association, George B. Chorpening, president Clarksburg.
Mineral County Good Roads Association, J. C. Watson, president, Keyser.
Greenview Road Association, B. F. Ball, president, Greenview.
Doddridge County Good Roads Association, H. H. Shinn, secretary, West Union.

Wisconsin

Wisconsin Highway Commissioners' Association, H. J. Kuelling, president, Milwaukee; George H. Mainwairing, secretary-treasurer, Gotham.
Oconomowoc-Milwaukee Road Association, L. J. Petit, Wisconsin National Bank, Milwaukee.

Wyoming

Wyoming Highways Association, Frank Wood, president, Casper; J. D. Kilborn, secretary, Elk Mountain.
Casper Industrial Club, Casper, H. J. Bingenheimer, president; Harold Banner, secretary.
Laramie Good Roads Club, Elmer Lovejoy, president, Laramie.
Good Roads Club of Douglas, W. J. Morsch, president; Wilkie Collins, secretary, Douglas.
Laramie County Good Roads Association, E. L. Emery president, Cheyenne; Roy W. Schenck, secretary, Cheyenne.
Sheridan Good Roads Club, George W. Perry, secretary, Sheridan.

MANUFACTURERS

National Association of Road Material and Machinery Manufacturers

Officers.—W. T. Beatty, president; S. Jones Philips, vice-president; Daniel T. Pierce, secretary-treasurer.

Headquarters.—32 Liberty Street, New York.

Purposes.—The objects of this Association shall be to arrange for and manage exhibitions of such road material and machinery as are the products of its members; to protect and further the business and interests of its members; to develop the relations existing between them, and to facilitate the interchange of ideas for their mutual benefit.

Membership.—The members of this Association shall be individuals, firms and corporations engaged in the manufacture of material and machinery used in the construction and maintenance of roads, provided that such manufacturers are not primarily contractors or agents for such material and machinery.

Manufacturers of Road Machinery and Equipment

Abenaque Machine Works (rock drills), F. H. Greaney, manager, Boston, Massachusetts.

Acme Equipment and Engineering Company, J. Webb Saffold, secretary, Cleveland, Ohio.

Acme Road Machinery Company, N. A. Cook, president and general manager; James W. Jones, treasurer; David B. Cook, secretary.

Acme Wagon Company (dump wagon), Emigsville, Pennsylvania.

J. D. Adams and Company (roader, grader and tractor), W. R. Adams, assistant manager, Indianapolis, Indiana.

Albany Belting and Supply Company (bitumen heater), Matthew Van Alstyne, president; A. Y. Van Alstyne, vice-president; William D. Baker, secretary; Charles H. Hay, treasurer.

Allis-Chalmers Company (gyratory crusher), Otto H. Falk, receiver; H. Schifflin, manager, crushing and cement machinery department, Milwaukee, Wisconsin.

American Metal Stamping Company, Lloyd A. Sagendorf, president; H. E. Snyder, secretary-treasurer, 20–52 Herman Street, Germantown, Pennsylvania (advertisement page 201).

Ames Plow Company, Oliver Ames, president; Frederick B. Hill, Boston, Massachusetts.

American Harrow Company, Detroit, Michigan.

American Process Company (rock and sand dryers), 68 Williams Street, New York City.

American Road Machinery Company, Kennett Square, Pennsylvania (advertisement page 201).

American Steel Scraper Company, W. F. Kilborn, general manager, Sidney, Ohio.

Auburn Wagon Company, Lee Roy Myers, president; Max Robinson, treasurer and manager, Martinsburg, West Virginia.

Austin-Western Company, Ltd., W. T. Beatty, president and general manager; W. I. Babb, vice-president and secretary; H. S. Maclay, treasurer; S. F. Beatty, assistant manager, Karpen Building, Chicago, Illinois (advertisement page 198).

Earle C. Bacon (rock crusher), 26 Cortland Street, New York City.

The Bain Wagon Company, W. W. Strong, Kenosha, Wisconsin.

A. D. Baker Company, A. D. Baker, vice-president, Swanton, Ohio.

The Baker Manufacturing Company (road graders), M. W. Baker, president, 337 W. Madison Street, Chicago, Illinois.

Bituminized Road Implement Company, Malden, Massachusetts.

A. B. Black Road Machinery Company, W. S. Railsback, president, 29 S. Market Street, Boston, Massachusetts.

Blystone Machinery Company, Cambridge Springs, Pennsylvania (advertisement page 205).

The Browning Steam Shovel Company, main office and works, Mansfield, Ohio.

Bucyrus Company (steam shovels), W. W. Coleman, president; E. K. Surgart, vice-president; G. A. Morison, secretary; D. P. Ells, treasurer, South Milwaukee, Wisconsin (advertisement page 196).

Buffalo Pitts Company (road roller), F. G. Batchellor, sales manager, Buffalo, New York (advertisement page 199).

Buffalo Steam Roller Company, J. F. Richardson, sales manager, Buffalo, New York.

The Burch Plow Works Company, J. L. Morrow, secretary, Crestline, Ohio (advertisement page 224).

A. Burlingame Company (road spraying machine), Charles D. Parker, manager, Worcester, Massachusetts.

Butterworth and Lowe (concrete mixer), 17 Huron Street, Grand Rapids, Michigan.

The Call-Watt Company (road graders), Richmond, Virginia.

Canton Culvert Company, Julius H. Schlafly, president; Perry Van Horne, secretary, treasurer and general manager; Chas. Haines, vice-president and superintendent, Canton, Ohio.

J. I. Case Threshing Machine Company, Frank Bull, president; Fredk. Robinson, vice-president; F. R. Norton, treasurer; Richards S. Robinson, secretary; R. B. Coleman, sales Manager, Racine, Racine County, Wisconsin.

Chain Belt Company (concrete mixers), C. W. Levalley, president; Wm. C. Sargent, vice-president and secretary; Wm. C. Frye, treasurer, Milwaukee, Wisconsin.

Chalmers and Williams, Inc. (gyratory crusher), Thos. S. Chalmers, president; Norman Williams, vice-president and treasurer; J. W. Young, second vice-president; W. B. Easton, secretary, Chicago Heights, Illinois.

Chicago Concrete Machinery Company, Payne G. West, secretary, 221 Grand Avenue, Milwaukee, Wisconsin.

Chicago Pneumatic Tool Company, George A. Rees, general manager, Fisher Building, Chicago, Illinois.

George C. Christopher and Son (concrete mixer), Wichita, Kansas.

Climax Road Machine Company, J. R. Manning, president; S. Jones Philips, vice-president; T. R. Clark, secretary-treasurer, Marathon, New York (advertisement page 201).

Columbia Wagon Company, W. T. Garrison, president; H. F. Yergey, treasurer and manager; Edward B. Smith, secretary, Columbia, Pennsylvania.

Concrete Form and Engine Company, 503 Wayne County Bank Building, Detroit, Michigan.

Cresson-Morriss Company, successors George V. Cresson Company (rock crushers), 18th Street and Allegheny Avenue, Philadelphia, Pennsylvania.

Cropp Concrete Machinery Company (concrete mixer), 118 N. La Salle Street, Chicago, Illinois.

Deere and Company (road plow), Moline, Illinois.

Des Moines Bridge and Iron Company, Curry Building, Pittsburgh, Pennsylvania.

Disc Grader and Plow Company, Allen L. Powlinson, president, Minneapolis, Minnesota.

Eagle Wagon Works, Frank E. Swift, president; Thomas M. Osborne, vice-president; Courtney C. Avery, secretary; Clarence F. Baldwin, treasurer, Auburn, New York.

The East Iron and Machine Company (portable asphalt paving plant), Lima, Ohio.

Emerson-Brantingham Company, successors to The Geiser Manufacturing Company (road rollers), Waynesboro, Pennsylvania (advertisement page 200).

Enterprise Manufacturing Company (road roller), Columbiana, Ohio.

The Erie Machine Company, P. W. Dietley, manager, Erie, Pennsylvania.

E. D. Etnyre and Company, Oregon, Illinois.

Eureka Machine Company, Inc., Lansing, Michigan.

Eureka Stone and Ore Crusher Company, A. Freund, president; W. J. Konvalinke, vice-president; A. Leunberger, vice-president; Francis A. Heald, secretary; I. L. Mitchell, treasurer and manager, Cedar Rapids, Iowa.

Everett Manufacturing Company (dumping boxes), 48 Lake Street, Newark, New Jersey.

Fairbanks, Morse and Company (tractors), Wabash Avenue and Eldredge Place, Chicago, Illinois.

Fairbanks Steam Shovel Company, Marion, Ohio.

A. B. Farquhar Company, Ltd. (engines), York, Pennsylvania.

Farrell Foundry and Machine Company, Franklin Farrell, president; Frank E. Hoadley, secretary; Charles F. Bliss, treasurer; Franklin Farrell, Jr., vice-president, Ansonia, Connecticut.

Flinchbaugh Manufacturing Company (road roller), York, Pennsylvania.

Francis Machinery Company, 4 Market Street, St. Louis, Missouri (advertisement page 206).

Frick Company, Inc. (engines), A. O. Frick, president; Ezra Frick, vice-president and general manager; W. H. Manns, secretary; D. Norris Benedict, treasurer.

Galion Iron Works Company, Henry Gottdiener, president; G. L. Stiefel, vice-president; D. C. Boyd, secretary-manager; L. M. Liggett, treasurer, Galion, Ohio (advertisement page 224).

Gardner Crusher Company, Ed. E. Gauche, treasurer, 556 W. 34th Street, New York, New York.

Glen Wagon Works, Harry Glen, manager, Seneca Falls, New York.

Glide Road Machine Company, Clyde Waterman, president, Minneapolis, Minnesota.

Globe Machinery and Supply Company (road drags), Des Moines, Iowa.

Goit Manufacturing Company, W. R. Goit, president; L. B. Taylor, secretary-treasurer, Oklahoma City, Oklahoma.

Good Roads Machinery Company, Kennett Square, Pennsylvania (advertisement page 201).

Griffith Iron Works Company, George Griffith, Jr., president, St. Louis, Missouri.

The Hanna Manufacturing Company (engineering instruments), Troy, New York.

The Hart-Parr Company (tractor), C. W. Hart, president, Charles City, Iowa.

Haywood Wagon Company, John W. Haywood, general manager, Newark, New York.

Holt Caterpillar Company (caterpillar engine), Peoria, Illinois.

Huber Manufacturing Company (road roller), S. E. Barlow, president and general manager; F. A. Huber, vice-president; E. C. L. Barlow, treasurer; E. Durfee, secretary, Marion, Ohio.

Chas. Hvass and Company (road machinery), B. Chas. Hvass, Wm. B. Lorenzo, 509–11 East 18th Street, New York City (advertisement page 205).

Ideal Concrete Machinery Company, M. Wetzstein, president and treasurer; G. B. Pulfer, vice-president and general manager; G. B. Hopkins, secretary, South Bend, Indiana.

Indiana Road Machine Company, Jno. Landenberger, president and treasurer; Chas. Stockman, Jr., secretary, Fort Wayne, Indiana (advertisement page 201).

Ingersoll-Rand Company (rock drills), W. L. Saunders, president; George Doubleday, vice-president; W. R. Grace, vice-president and treasurer; George R. Elder, vice-president; J. S. Phipps, vice-president; F. A. Brainard, secretary, 11 Broadway, New York City.

International Harvester Company of America (tractors), Harvester Building, Chicago, Illinois (advertisement page 202).

International Instrument Company, Arthur Kendrick, treasurer, 23 Church Street, Cambridge, Massachusetts (advertisement page 208).

Iroquois Iron Works, Arthur W. Sewall, president; A. D. Andrews, vice-president; Ira Atkinson, treasurer, Buffalo, New York (advertisement page 206).

Jaeger Machine Company (concrete mixer), Columbus, Ohio.

Jeffery Manufacturing Company, East First Avenue, Columbus, Ohio.

The Kelly Manufacturing Company (road drags), Waterloo, Iowa.

Kelly-Springfield Road Roller Company, Chas. M. Greiner, president, Springfield, Ohio.

The Kent Machine Company, M. L. Garrison, president; W. S. Kent, vice-president; F. H. Merrell, secretary-treasurer, Kent, Ohio (advertisement page 207).

Kent Mill Company (rock crusher), 10 Rapelyea Street, Brooklyn, New York.

The Kilbourne and Jacobs Manufacturing Company (scrapers and wheelbarrows), Columbus, Ohio.

The Knickerbocker Company (mixers), W. B. Knickerbocker, Jackson, Michigan.

Koehring Machine Company, Wm. J. Koehring, president; Richard Keil, vice-president; P. Koehring, secretary-treasurer, 615–17 Germania Building, Milwaukee, Wisconsin.

Kolesch and Company, Inc. (surveyors' instruments), Emilie Kolesch, president; Percy A. Koelsch, treasurer, 138 Fulton Street, New York City.

Lansing Company, formerly Lansing Wheelbarrow Company (concrete mixers, etc.), E. W. Sparrow, president; F. Thoman, vice-president; A. C. Stebbins, secretary and general manager; H. E. Moore, treasurer, Lansing, Michigan.

Lawrence Pump and Engine Company, Lawrence, Massachusetts.

Link-Belt Company, Inc. (hoisting cranes), James M. Dodge, chairman; Charles Piez, president and treasurer; Glenn G. Howe, vice-president, Chicago, Illinois (advertisement page 203).

E. J. McHarg and Company (concrete mixers), E. J. McHarg, L. R. McHarg, 3 Crandall Street, Binghamton, New York.

McKiernan-Terry Drill Company (rock drill), 117 Broadway, New York, New York.

Lewis McNutt (clay, sewer, block and pipe), 14 South Walnut Street, Brazil, Indiana.

Marion-Osgood Company (traction shovels), 51 State Street, Albany, New York.

Marion Steam Shovel Company, Geo. W. King, president and general manager; Frank A. Huber, vice-president and treasurer; R. H. Reidenbaugh, secretary, Marion, Ohio.

Marsh-Capron Manufacturing Company (concrete mixers), H. M. Capron secretary, Old Colony Building, Chicago, Illinois.

Milburn Wagon Company, H. W. Suydam, president, Toledo, Ohio.

The Miles Manufacturing Company (concrete mixers), D. P. Vining, Jackson, Michigan.

Milwaukee Concrete Mixer and Machinery Company, W. J. Roseberry, Jr., president and general manager; Eugene Warnimont, vice-president; A. G. Bodden, secretary-treasurer, Milwaukee, Wisconsin (advertisement page 204).

Minneapolis Steel and Machinery Company (road tractor), Minneapolis Minnesota.

Monarch Road Roller Company, Nat Tyler, Jr., president, Groton, New York (advertisement page 201).

Morse Twist Drill and Machine Company, New Bedford, Massachusetts.

Municipal Engineering and Contracting Company (concrete mixers), F. C. Austin, president, 607–11 Railway Exchange Building, Chicago, Illinois,

Munnsville Plow Company, J. E. Sperry, president, Munnsville, New York (advertisement page 225).

The New England Cement Gun Company. Wm. L. Church, president; Nils F. Ambursen, vice-president; Chas. E. Parsons, secretary and treasurer, 88 Pearl Street, Boston, Massachusetts.

New England Contracting Company (tar sprayer), Worcester, Massachusetts.

New Holland Machine Company, P. S. Hess, secretary, New Holland, Pennsylvania.

Novo Engine Company, C. E. Bement, secretary and manager, Lansing, Michigan.

Nims Concrete Machinery (concrete mixer), Philadelphia, New York.

Ohio Ceramic Engineering Company (concrete mixers), Cleveland, Ohio.

The Ohio Manufacturing Company, A. B. Whitney, president and treasurer; W. E. Robinson, vice-president; Chas. C. Kouns, secretary, Upper Sandusky, Ohio.

The Ohio Road Machinery Company, W. A. Heusner, president; D. E. Graves, vice-president; C. H. Dudley, secretary-treasurer, Oberlin, Ohio.

Oliver Chilled Plow Works, South Bend, Indiana.

The Wm. J. Oliver Manufacturing Company (dump and spreader cars), Knoxville, Tennessee.

Oshkosh Manufacturing Company (concrete mixer), Oshkosh, Wisconsin.

Otto Gas Engine Works, 3411 Walnut Street, Philadelphia, Pennsylvania.

Pennsylvania Crusher Company, Stephen Girard Building, Philadelphia, Pennsylvania.

Perfection Road Machinery Company, P. C. Thomas, president; J. H. Petri, vice-president; E. G. Hartel, secretary and treasurer; W. T. Resch, treasurer, Galion, Ohio.

Petrolithic Company, The, Los Angeles, California (advertisement page 208).

The Pillsbury Sprayer, Gloucester, Massachusetts.

Pioneer Tractor Manufacturing Company, Winona, Minnesota.

Port Huron Engine and Thresher Company, C. F. Harrington, president; H. L. Stevens, vice-president; A. E. West, general manager; D. C. Kinch, secretary; J. T. Sullivan, treasurer, Port Huron, Michigan (advertisement page 208).

Power Mining Machinery Company, 115 Broadway, New York, New York.

Quincy Engine Company, I. C. Walk, general manager, Quincy, Pennsylvania.

Ransome Concrete Machinery Company, A. W. Ransome, Dunellen, New Jersey.

Rapid Mixer Company, 84 Porter Block, Grand Rapids, Michigan.

Ruggles-Coles Engineering Company, Wm. B. Ruggles, president; Robt. G. McGann, vice-president; Lindsay R. Christie, secretary-treasurer, 50 Church Street, New York City.

M. Rumely Company (tractors), 9271 Main Street, La Porte, Indiana.

The Russell Company, J. W. McClymonds, president; C. M. Russell, vice-president; E. C. Merwin, second vice-president and secretary; Geo. H. McCall, treasurer, Massillon, Ohio.

Russell Grader Manufacturing Company, E. E. Ellerston, president and manager; C. O. Wold, secretary-treasurer, Minneapolis, Minnesota.

Sanitary Street Flushing Machine Company, W. R. Anders, secretary, St. Louis, Missouri.

The Schaefer Manufacturing Company (concrete mixers), Park and Main Streets, Berlin, Wisconsin.

Sexton, Inc. (concrete mixer), Milwaukee, Wisconsin.

Shunk Plow Company, Bucyrus, Ohio.

Skow Manufacturing Company (road machinery), Newton, Iowa.

T. L. Smith Company (concrete mixer), T. L. Smith, president; C. F. Smith, vice-president; W. J. Buckley, secretary-treasurer, 1304 Majestic Building, Milwaukee, Wisconsim.

Smith and Sons Manufacturing Company, William J. Smith, president; Kansas City, Missouri.

Spray Nozzle Company, George S. Crittenden, general manager, 205 Devonshire Street, Boston, Massachusetts.

R. H. Staley (tamping machines), Box 229, Springfield, Illinois.

Standard Manufacturing Company, Pliny E. Bassett, proprietor, Worcester, Massachusetts.

Standard Scale and Supply Company (concrete mixer), John C. Reed, president, 243 Water Street, Pittsburgh, Pennsylvania.

Studebaker Corporation (road machinery), J. M. Studebaker, president; Clement Studebaker, Jr., general manager; Geo. M. Studebaker, treasurer; A. R. Erksine, secretary, South Bend, Indiana.

Sturtevant Mill Company (generators), Thos. L. Sturtevant, president Clayton and Park Streets, Boston, Massachusetts.

Sullivan Machinery Company (rock drills), F. K. Copeland, president; J. Duncan Upham, treasurer; Albert Ball, mechanical engineer; Thos. W. Fry, secretary, Claremont, New Hampshire.

Syracuse Chilled Plow Company, Carlton A. Chase, president and treasurer; Wm. W. Ward, vice-president and secretary, Syracuse, New York.

Tarrant Manufacturing Company (road oiling appliances), W. P. Tarrant, president; W. R. Wilson, treasurer, Saratoga Springs, New York (advertisement page 206).

The Thew Automatic Shovel Company, F. A. Smith, president; R. Thew, vice-president and general manager; E. M. Pierce, treasurer, Lorain, Ohio.

The Tiffin Wagon Company, W. S. Shelly, manager, Tiffin, Ohio.

Traylor Engineering and Manufacturing Company (gyratory crushers), 30 Church Street, New York City.

Trautwein Dryer and Engineering Company, 417 South Dearborn Street, Chicago, Illinois.

The Troy Wagon Works Company, Troy, Ohio.

Universal Crusher Company, 303 North 3d Street, Cedar Rapids, Iowa.

Union Iron Works, Lackawanna Siding, Hoboken, New Jersey.

Universal Road Machinery Company, George H. Ford, president, 2 Rector Street, New York City.

Utica Pipe and Foundry Company, Utica, New York.

Uvalde Asphalt Paving Company, Ralph T. Tokeby, president; John D. Marston, treasurer; Frank S. Brown, secretary, 1 Broadway, New York City.

Virginia Bridge and Iron Company, C. Edwin Michael, president; T. T. Fishburne, vice-president and treasurer; Jno. R. Parker, secretary, Roanoke, Virginia.

Watson Wagon Company, A. A. Keesler, president; C. M. Grouse, vice-president; Levi S. Chapman, secretary-treasurer, Canastota, New York.

Western Wheeled Scraper Company, W. I. Babb, president; W. D. Foulke, treasurer; Frank C. Worthington, secretary, Aurora, Illinois (advertisement page 198).

Wheeling Mold and Foundry Company (rock crusher), Leroy A. Kling, sales manager, Wheeling, West Virginia.

Williams Patent Crusher and Pulverizer Company, Milton F. Williams, president; Hoyt H. Green, vice-president; George E. Cottrill, secretary-treasurer; Edward H. Fricks, superintendent, 2701–23 North Broadway, St. Louis, Missouri.

Wood Brothers Thresher Company, F. J. Wood, president; E. E. Wood, vice-president; R. L. Wood, secretary-treasurer, Des Moines, Iowa.

Wood Drill Works, Paterson, New Jersey.

The F. B. Zieg Manufacturing Company (culverts), Fredericktown, Ohio (advertisement page 223).

Manufacturers of Road Material and Engineering Investments

Alden Speare's Sons Company (road oils), Boston, Massachusetts.

American Asphaltum and Rubber Company, J. F. Hill, president and manager; H. Rawstron, vice-president; P. H. Hoag, secretary; H. F. Bunde, treasurer; Geo. B. Adams, advertising manager, 609–619 Harvester Building, Chicago, Illinois.

American Bridge Company of New York, George L. Denio, chief clerk, Hudson Terminal, 30 Church Street, New York City.

American Cast Iron Pipe Company, Birmingham, Alabama.

American Paving and Manufacturing Company, Indianapolis, Indiana.

American Rolling Mill Company (culvert iron), Middletown, Ohio (advertisement page 220).

Amies Road Company, John Rice, president; W. T. Newcomb, engineer, Drake Building, Easton, Pennsylvania (advertisement page 173).

American Sheet and Tin Plate Company (culverts), H. V. Jamison, manager, Pittsburgh, Pennsylvania.

American Tar Company, Charles P. Price, manager; road department, 137 Pleasant Street, Malden, Massachusetts (advertisement page 197).

Atlantic Gas light Company, R. C. Congdon, manager, Electric and Gas Building, Atlanta, Georgia.

Atlantic Westrumite Company, Inc., J. H. Cranford, president; R. Y. Filbert, vice-president; A. H. Putnam, secretary and treasurer, 2620 E. Street N.W., Washington, D. C. (advertisement page 174).

R. D. Baker Company (expansion joints), R. D. Baker, president, 73 Home Bank Building, Detroit, Michigan.

Barber Asphalt Paving Company, Charles W. Bayless, manager road department, Land Title Building, Philadelphia, Pennsylvania (advertisement page 176).

Barrett Manufacturing Company, F. S. Hutchinson, manager Tarvia department, 17 Battery Place, New York, New York (advertisement page 177).

Bausch and Lomb Optical Company (instruments), Rochester, New York (advertisement page 207).

Baker and Lockwood Manufacturing Company (tents), Kansas City, Missouri.

The L. Beckmann Company (surveyors' instruments), 600 Adams Street, Toledo, Ohio.

C. L. Berger and Sons (surveyors' instruments), 37 Williams Street, Boston, Massachusetts.

The Binder Company (road oils), John H. Hurlbutt, president, 82 Beaver Street, New York, New York.

Birdsboro Stone Company, Chas. A. Bergdoll, president; Jno. M. MacBurney general manager; E. C. Bergdoll, treasurer; Albert T. Hall, secretary, 614 Bulletin Building, Philadelphia, Pennsylvania.

Bituminized Road Company (pavement manufacturer), Reliance Building, Kansas City, Missouri.

Rudolph S. Blome Company (paving block), Rudolph S. Blome, president; City Hall Square Building, Chicago, Illinois.

F. E. Brandis Sons Company (surveyors' instruments), 610–614 Gates Avenue, Brooklyn, New York.

Buff and Buff Manufacturing Company (surveyors' instruments), Jamaica Plains, Massachusetts.

Edward E. Buhler Company (supplies), Edward E. Buhler, president and general manager, 103 Park Avenue, New York City.

Burton Powder Company, J. Burton, president, Pittsburgh, Pennsylvania.

Byerley and Sons (road oils), Frank A. Byerley, Cleveland, Ohio.

Calcide Process Company, Sears Building, Boston, Massachusetts.

Champion Bridge Company, Wilmington, Ohio.

Chicago Steel Tape Company, L. A. Nichols, president, 6229–6233 Cottage Grove Avenue, Chicago, Illinois.

J. B. Clow and Sons (cast iron culvert pipe), Chicago, Illinois (advertisement page 221).

Geo. S. Comstock, Mechanicsburg, Pennsylvania.

Concrete Guard Rail Company, J. Y. McClintock, manager, Rochester, New York.

The Conneaut Shovel Company, G. W. Benton, secretary, Conneaut, Ohio.

F. D. Cummer and Sons Company, Cleveland. Ohio.

Cyclone Drill Company, Orrville, Ohio.

Eugene Dietzen Company (surveyor's instruments), 214–220 East 23d Street, New York City.

Dolarway Paving Company, W. M. Pindell, president, 95 Liberty Street, New York, New York (advertisement page 180).

Donaldson Iron Company, Emaus, Pennsylvania (advertisement page 221).

E. I. du Pont de Nemours Powder Company, Wilmington, Delaware.

The Dustoline for Roads Company, Jno. A. Lamson, Jr., president; Edwin R. Lamson, vice-president; W. J. Lamson, treasurer; Fred L. LaRowe, secretary, Summit, New Jersey (advertisement page 197).

Expanded Metal Company (concrete reinforcement), Walter Chess, president; Chas. S. Reno, treasurer and manager, 1182 Broadway, New York, New York.

Farris Bridge Company, William Farris, president, Jenkins Arcade Building, Pittsburgh, Pennsylvania (advertisement page 226).

The France Stone Company, L. H. Hawblitz, Ohio Building, Toledo, Ohio (advertisement page 171).

Louis Frey and Company (surveyors' instruments), A. H. Honaker, manager, 116 Williams Street, New York, New York.

Fibred-Asphalt Company, George A. Henderson, St. Albans, West Virginia (advertisement page 194).

Glamorgan Pipe and Foundry Company (cast iron culvert pipe), Lynchburg, Virginia (advertisement page 221).

The Glidden Varnish Company, Cleveland, Ohio (advertisement page 219).

W. and L. E. Gurley (surveyors' instruments), Troy, New York.

Harry Brothers Company (metal culverts), Newport, Kentucky.

O. K. Harry Steel Company, 2340–42 Papin Street, St. Louis, Missouri.

Hartford Paving and Construction Company (culverts), Hartford, Connecticut.

The Hastings Pavement Company, E. J. Morrison, president and general manager; O. A. Palmer, treasurer; C. P. Pultz, secretary, 25 Broad Street, Broad-Exchange Building, New York, New York (advertisement page 183).

Hassam Paving Company, Matthew J. Whittall, president; Harold Parker, vice-president; Alfred Thomas, treasurer; Walter E. Hassam, general manager, Slater Building, Worcester, Massachusetts (advertisement page 194).

Headley Good Roads Company (road oils), W. T. Headley, president; 1634 Real Estate Trust Building, Philadelphia, Pennsylvania (advertisement page 196).

The Highway Culvert Form Company, 100–2 Madison Street, Ottawa, Illinois.

Hotchkiss Lock Metal Form Company, M. S. Hotchkiss, president, Binghamton, New York.

Impervious Product Company, Thos. J. McDonald, president, Baltimore, Maryland.

Independent Powder Company of Missouri, N. P. Rood, president, Joplin, Missouri.

Indian Refining Company, Inc., 17 Battery Place, New York, New York.

International Asphalt Company, Chamber of Commerce Building, Chicago, Illinois.

Kentucky Culvert Company, Chas. J. Fegenbush, general manager, Buechel, Kentucky.

Keystone National Powder Company, Emporium, Pennsylvania.

Kueffel and Esser (surveyors' instruments), Hoboken, New Jersey.

Ledder and Probst (surveyors' instruments), Boston, Massachusetts.

F. J. Lewis Manufacturing Company (road oils), Moline, Illinois.

Lock Joint Pipe Company, A. M. Hirsh, treasurer, Ampere, New Jersey.

The Lufkin Rule Company, A. M. Marshall, president, Saginaw, Michigan.

Lynchburg Foundry Company (cast iron culvert pipe), Lynchburg, Virginia (advertisement page 221)

Massillon Iron and Steel Company, Massillon, Ohio (advertisement page 221).

Memphis Stone and Gravel Company, Memphis, Tennessee.

Merrillat Culvert Core Company (culvert forms), C. C. Merrillat, general manager, Winfield, Iowa.

The Midland Bridge Company, 504–10 Midland Building, Kansas City, Missouri.

Morrison Tent and Awning Company, 115-17 Olive Street, St. Louis, Missouri.

National Concrete Company, 805 Traction Terminal Building, Indianapolis, Indiana.

The National Safety Wood Paving Company, James A. Cogswell, president, 1520 Real Estate Trust Building, Philadelphia, Pennsylvania.

National Tube Company, Wm. B. Schiller, president, Pittsburgh, Pennsylvania.

The Neuchatel Asphalt Company, Ltd., Wm. K. Bonfield, sales manager, 291 Broadway, New York City.

Northfield Iron Company, 422 Water Street, Northfield, Minnesota.

Orenstein-Arthur Koppel Company (dump cars), 30 Church Street, New York, New York.

C. F. Pease Company (blue prints), 166 West Adams Street, Chicago, Illinois.

The Pennsylvania Steel Company, Morris Building, 1421 Chestnut Street, Philadelphia, Pennsylvania.

Pennsylvania Trojan Powder Company, Allentown, Pennsylvania.

The Portage Silica Company, J. G. Butler, Jr., president; E. E. Klooz, secretary and general manager; H. Z. Kelly, treasurer, 501 Stambaugh Building, Youngstown, Ohio (advertisement page 226).

Portsmouth Steel Company, T. H. Jones, secretary, Portsmouth, Ohio.

Potts Powder Company, Geo. W. Banks, general manager, 200 Fifth Avenue, New York, New York.

Quick Unloading Car Chute Company, 807 Title Building, Birmingham, Alabama.

Robeson Process Company, J. S. Robeson, president, Pennington, New Jersey (advertisement page 192).

Rocmac Limited, Inc., Edward A. Paterson, president; William Cooling secretary, North Tonawanda, New York.

E. G. Ruehle (surveyors' instruments), 119 Fulton Street, New York City.

Sicilian Asphalt Paving Company, Howard Carroll, president; Harry Haggerty, secretary; George C. Clausen, treasurer, 41 Park Row and 12th Avenue and 54th Street, New York City.

E. G. Soltman (surveyors' instruments), 134 West 29th street, New York City.

Solvay Process Company, Fredk. R. Hazard, president; Rowland G. Hazard, vice-president; L. O. MacDaniel, treasurer; Geo. E. Francis, secretary, Syracuse, New York (advertisement page 185).

Standard Asphalt and Rubber Company, E. G. Leszynsky, president, 137 North LaSalle Street, Chicago, Illinois.

Standard Cast Iron Pipe Company, Bristol, Pennsylvania (advertisement page 221).

Standard Oil Company of New York, 26 Broadway, New York City (advertisement page 184).

Standard Oil Company of New Jersey, 26 Broadway, New York City (advertisement page 186).

Steel Protected Concrete Company, H. A. Miner, president, Real Estate Trust Building, Philadelphia, Pennsylvania (advertisement page 193).

Sun Company, J. N. Pew, Jr., president, 1421 Chestnut Street, Morris Building, Philadelphia, Pennsylvania (advertisement page 196).

Sweeney and Gray (road supplies), J. A. Gray, manager, 61 Sixth Street, Long Island City, New York.

Texas Company, J. S. Cullinan, president; E. C. Lufkin, vice-president; Arnold Schlaet, vice-president; L. E. Brooks, treasurer; Jas. L. Autry, secretary, Texas Building, Houston, Texas (advertisement page 187).

Traub and Helfrecht (culvert), Germania, Pennsylvania.

Trussed Concrete Steel Company, Detroit, Michigan.

Universal Drafting Machine Company, Cleveland, Ohio.

Union Oil Company of California, Wm. L. Soleau, comptroller; Alexander Sclater, manager, sales department, Union Oil Building, Los Angeles, California.

Union Paving Company, B. F. Richardson, vice-president, Fidelity Mutual Life Building, Philadelphia, Pennsylvania.

U. S. Asphalt Refining Company, O. E. Thurber, vice-president; Geo. L. Whitney, secretary; Jos. R. Draney, sales manager, 90 West Street, New York City (advertisement page 195).

U. S. Cast Iron Pipe and Foundry Company, L. R. Lemoine, president; Geo. J. Long, vice-president; B. F. Haughton, secretary and treasurer, Morris Building, Philadelphia, Pennsylvania (advertisement page 223).

The United Gas Improvement Company, Samuel T. Bodine, president; Paul Thompson, vice-president; Walter H. Fulweiler, manager, road department, Philadelphia, Pennsylvania (advertisement page 226).

The Wadsworth Stone and Paving Company. W. C. Thoma, president and general manager; J. A. Siedle, secretary and treasurer, Lambert Street and Pennsylvania Railroad, Pittsburgh, Pennsylvania (advertisement page 190).

Warner-Quinlan Asphalt Company, P. R. Quinlan, vice-president, Union Building, Syracuse, New York.

Warren Brothers Company, George C. Warren, president and general manager; Chas. W. Young, vice-president; Ralph H. Warren, treasurer; Albert C. Warren, secretary, 59 Temple Place, Boston, Massachusetts (advertisement page 191).

Washington Block and Asphalt Tile Company, R. H. Johnson, president, Washington, D. C.

R. D. Wood and Company (cast iron culvert pipe), Philadelphia, Pennsylvania (advertisement page 221).

The Westrumite Company, L. S. Van Westrum, president; G. S. Van Westrum, vice-president, treasurer and general manager; J. H. Fowler, secretary, 343 South Dearborn Street, Chicago, Illinois (advertisement page 174).

Dealers in or Agents for Road Making Machinery

Barron and Cole Company, James S. Barron, president, treasurer and general manager; Nelson C. Dennis, secretary, 127 Franklin Street, New York City.

C. N. Carpenter Supply Company (grader, scraper, spreader and leveler), Canton, Ohio.

Harold L. Bond Company, of New York, Harold L. Bond, president; Howard C. Weaver, secretary-treasurer; Geo. S. Hedge, vice-president; 78-80 Bridge Street, New York City.

Henry J. McCoy Company, Henry J. McCoy, president; Jas. W. McCoy, vice-president; John G. Wentink, treasurer; Frank E. Hall, secretary, 65 Dey Street, New York City.

The Good Roads Machinery Company, Kennett Square, Pennsylvania.

Lima Contractors Supply Company, Delphos, Ohio.

Geo. E. Ritchey Supply Company, Columbus, Ohio.

Association of American Portland Cement Manufacturers

Officers.—John B. Lober, president, president Vulcanite Portland Cement Company, Land Title Building, Philadelphia, Pa.; Robert S. Sinclair, vice-president, vice-president Alsen's American Portland Cement Works, 45 Broadway, New York City; W. H.

Harding, treasurer, president Whitehall Cement Manufacturing Company, Land Title Building, Philadelphia, Pa.; Percy H. Wilson, secretary, 1526 Land Title Building, Philadelphia, Pa.

Headquarters.—1526 Land Title Building, Philadelphia, Pennsylvania.

Objects.—To acquire and disseminate information concerning the best practice in the use of cement and concrete.

To raise the standards of construction.

To emphasize the necessity of careful attention to all details of construction and to the selection of such materials as will produce the best results.

To give to anyone requesting same, information they may desire on the proper use of cement and concrete.

Portland Cement Manufacturers

Allentown Portland Cement Company, Allentown, Pennsylvania.
Alpha Portland Cement Company, Easton, Pennsylvania.
Alsen's American Portland Cement Works, 45 Broadway, New York City.
American Cement Company of New Jersey, Pennsylvania Building, Philadelphia, Pennsylvania.
Ash Grove Lime and Portland Cement Company, R. A. Long Building, Kansas City, Missouri.
Atlantic and Gulf Portland Cement Company, Ragland, Alabama.
Atlas Portland Cement Company, 30 Broad Street, New York City, New York.
Bath Portland Cement Company, Newark, New Jersey.
California Portland Cement Company, Los Angeles, California.
Castalia Portland Cement Company, Publication Building, Pittsburgh, Pennsylvania.
Cayuga Lake Cement Company Ithaca, New York.
Chicago Portland Cement Company, 30 N. LaSalle Street, Chicago, Illinois.
Clinchfield Portland Cement Corporation, Kingsport, Tennessee.
Colorado Portland Cement Company, Denver, Colorado.
Continental Portland Cement Company, St. Louis, Missouri.
Coplay Cement Manufacturing Company, Land Title Building, Philadelphia, Pennsylvania.
Crescent Portland Cement Company, Wampum, Pennsylvania.
Dewey Portland Cement Company, Scarritt Building, Kansas City, Missouri.
Dexter Portland Cement Company, Nazareth, Pennsylvania.
Diamond Portland Cement Company, Williamson Building, Cleveland, Ohio.
Dixie Portland Cement Company, Chattanooga, Tennessee.
Edison Portland Cement Company, Stewartsville, New Jersey.
German-American Portland Cement Works, La Salle, Illinois.
Glens Falls Portland Cement Company, Glens Falls, New York.
Helderberg Cement Company, Albany, New York.
Huron Portland Cement Company, Ford Building, Detroit, Michigan.
Iola Portland Cement Company, Iola, Kansas.
Iowa Portland Cement Company, Des Moines, Iowa.
Kosmos Portland Cement Company, Kosmosdale, Kentucky.
Lehigh Portland Cement Company, Allentown, Pennsylvania.
Louisville Cement Company, Louisville, Kentucky.

Michigan Portland Cement Company, Chelsea, Michigan.
Nazareth Cement Company, Nazareth, Pennsylvania.
New Aetna Portland Cement Company, Detroit, Michigan.
New Castle Portland Cement Company, New Castle, Pennsylvania.
Newaygo Portland Cement Company, Grand Rapids, Michigan.
Norfolk Portland Cement Corporation, 604 Pennsylvania Building, Philadelphia, Pennsylvania.
Northwestern States Portland Cement Company, Mason City, Iowa.
Ogden Portland Cement Company, Ogden, Utah.
Oklahoma Portland Cement Company, Ada, Oklahoma.
Peerless Portland Cement Company, Union City, Michigan.
Peninsular Portland Cement Company, Jackson, Michigan.
Penn-Allen Cement Company, Allentown, Pennsylvania.
Pennsylvania Cement Company, 29 Broadway, New York City, New York.
Phoenix Portland Cement Company, Nazareth, Pennsylvania.
Portland Cement Company of Utah, Salt Lake City, Utah.
Riverside Portland Cement Company, Los Angeles, California.
San Antonio Portland Cement Company, San Antonio, Texas.
Security Cement and Lime Company, Baltimore, Maryland.
Southwestern Portland Cement Company, El Paso, Texas.
Southwestern States Portland Cement Company, Dallas, Texas.
Standard Portland Cement Company, Charleston, South Carolina.
The Superior Portland Cement Company, Cincinnati, Ohio.
Texas Portland Cement Company, Cement, Texas.
Tidewater Portland Cement Company, Baltimore, Maryland.
Union Sand and Material Company, Liggett Building, St. Louis, Missouri.
United Kansas Portland Cement Company, Iola, Kansas.
United States Portland Cement Company, Denver, Colorado.
Universal Portland Cement Company, 72 West Adams Street, Chicago, Illinois.
Virginia Portland Cement Company, 26 Beaver Street, New York City, New York.
Vulcanite Portland Cement Company, Land Title Building, Philadelphia, Pennsylvania
Wabash Portland Cement Company, Ford Building, Detroit, Michigan.
Whitehall Cement Manufacturing Company, Land Title Building, Philadelphia, Pennsylvania.
Wolverine Portland Cement Company, Coldwater, Michigan.

Foreign Member

Canada Cement Company, Limited, Montreal, Canada.

National Paving Brick Manufacturers Association

Officers.—Charles J. Deckman, president, Cleveland, Ohio; J. W. Robb, vice-president, Clinton, Indiana; C. C. Barr, treasurer, Streator, Illinois; Will P. Blair, secretary, Cleveland, Ohio; H. H. MacDonald, assistant secretary, Cleveland, Ohio.

Purposes.—The National Paving Brick Manufacturers Association of this country was organized for the following purposes:

1. A dissemination among its membership of technical knowledge relating to the manufacture of their product.
2. To bring to the attention of the public the merits of Vitrified Brick as a paving material.

3. To influence to the greatest possible extent the proper construction of brick streets.

4. For furnishing truthful and reliable information regarding other paving materials, and their comparative value as pavements when considered with brick pavements.

Paving Brick Manufacturers

Albion Vitrified Brick Company, Ben L. Mayne, Albion, Illinois.
Alliance Clay Product Company, J. B. Wilcox, Alliance, Ohio.
Alton Brick Company, Ed. Rodgers, Alton, Illinois.
American Sewer Pipe Company, A. S. McComb, Akron, Ohio.
Ashtabula Shale Brick Company, N. C. Ralph, Ashtabula, Ohio.
Athens Brick Company, W. N. Alderman, Athens, Ohio.
Barr Clay Company, The, C. C. Barr, Streator, Illinois.
Bessemer Limestone Company, C. C. Blair, Youngstown, Ohio.
Big Four Clay Company, G. O. French, Canton, Ohio.
Bloomfield Brick Company, C. E. Davis, Bloomfield, Indiana.
Bolivar Face Brick Company, J. B. Hammond, Bolivar, Pennsylvania.
Boone Brick, Tile and Paving Company, W. H. Brecht, Boone, Iowa.
Brick, Terra Cotta and Tile Company, M. E. Gregory, Corning, New York.
Cleveland Brick and Clay Company, F. M. Brady, Cleveland, Ohio.
Cleveland Vitrified Brick Company, E. B. Wentworth, Oklahoma City, Oklahoma.
Clinton Paving Brick Company, J. W. Robb, Clinton, Indiana.
Copeland-Inglis Shale Brick Company, B. A. Inglis, Birmingham, Alabama.
Corry Brick and Tile Company, D. Warren De Rosay, Corry, Pennsylvania.
Danville Brick Company, W. P. Whitney, Danville, Illinois.
Deckman-Duty Brick Company, C. J. Deckman, S. M. Duty, Cleveland, Ohio.
Denny-Renton Clay and Coal Company, Seattle, Washington.
DuBois-Butler Brick Company, Donald McDonald, DuBois, Pennsylvania.
Dunn Wire-Cut-Lug Brick Company, Conneaut, Ohio, Frank B. Dunn.
Glenn-Gery Brick and Cement Company, W. A. Gery, Reading, Pennsylvania.
Hammond Fire Brick Company, T. I. Brett, Fairmont, West Virginia.
Hankinson and Hagler, Augusta, Georgia.
Harris Brick Company, T. Lawson Moores, Cincinnati, Ohio.
Hocking Valley Brick Company, L. J. Murphy, Nelsonville, Ohio.
Indiana Paving Brick and Block Company, W. W. Winslow, Indianapolis, Indiana.
Kentucky Vitrified Brick Company, M. J. Bannon, Louisville, Kentucky.
Kline Brick Company, John, John Kline, Wickliffe, Ohio.
Kushequa Brick Company, E. K. Kane, Kushequa, Pennsylvania.
McAvoy Vitrified Brick Company, 1345 Arch Street, Philadelphia, Pennsylvania.
Marion Brick Works, Montezuma, Indiana.
Mayer Brick Company, C. P., C. P. Mayer, Bridgeville, Pennsylvania.
Medora Shale Brick Company, C. C. McMillan, Medora, Indiana.
Metropolitan Paving Brick Company, J. G. Barbour, Canton, Ohio.
Murphysboro Paving Brick Company, W. H. Hill, East St. Louis, Illinois.
Nelsonville Brick Company, C. H. Doan, Nelsonville, Ohio.
Newburgh Brick and Clay Company, J. R. Zmunt, Cleveland, Ohio.
Novelty Brick and Coal Company. R. L. Shoemaker, Newcomerstown, Ohio.

Peebles Paving Brick Company, F. L. Manning, Portsmouth, Ohio.
Poston Paving Brick Company, J. M. Waugh, Crawfordsville, Indiana.
Purington Paving Brick Company, Galesburg, Illinois.
Saginaw Paving Brick Company, J. H. Qualmann, Saginaw, Michigan.
Shawmutt Paving Brick Company, Alfred Yates, Shawmutt, Pennsylvania.
Smith, Company, A. F., P. A. Smith, New Brighton, Pennsylvania.
South Zanesville Sewer Pipe and Brick Company, J. C. Bolen, Jr., Zanesville, Ohio.
Springfield Paving Brick Company, A. L. Converse, Springfield, Illinois.
Sterling Brick Company, Olean, New York.
Stipp, Peter, successor to Scranton Vitrified Brick Company, Scranton, Pennsylvania.
Streator Paving Brick Company, E. F. Plumb, Streator, Illinois.
Terre Haute Vitrified Brick Company, J. M. Hoskins, Terre Haute, Indiana.
Thomas Moulding Company, T. C. Moulding, Chicago, Illinois.
Thornton Fire Brick Company, D. R. Potter, Clarksburg, West Virginia.
Townsend Brick and Contracting Company, T. B., O. N. Townsend, Zanesville, Ohio.
Trimble Brick Manufacturing Company, J. H. Simpson, Dayton, Ohio.
United Brick Company, G. H. Francis, Greensburg, Pennsylvania.
Wabash Clay Company, Veedersburg, Indiana.
Wassall Brick Company, R. L. Lewis, Gloucester, Ohio.
Westport Paving Brick Company, John W. Hall, Baltimore, Maryland.
Windsor Brick Company, J. T. Windsor, Akron, Ohio.
Wooster Shale Brick Company, W. R. Barnhardt, Jr., Wooster, Ohio.

Allentown Paving Brick Company, Allentown, Pennsylvania.
Alliance Brick Company, Alliance, Ohio.
Banner Clay Works, Edwardsville, Illinois.
Barber Asphalt Paving Company, Des Moines, Iowa.
Binghamton Paving Block Company, Binghamton, New York.
Bloomfield Brick Company, Bloomfield, Indiana.
Buffalo Brick Company, Buffalo, Kansas.
Burke Brothers Brick Company, Fort Smith, Arkansas.
Carlyle Paving Brick Company, Portsmouth, Ohio
Clearfield Brick Manufacturing Company, Clearfield, Pennsylvania.
Clearfield Clay Working Company, Clearfield, Pennsylvania.
Coffeyville Shale Brick Company, Coffeyville, Kansas.
Coffeyville Vitrified Brick and Tile Company, Coffeyville, Kansas.
Detroit Vitrified Brick Company, Detroit, Michigan.
Flint Brick and Coal Company, Des Moines, Iowa.
Fultonham Brick Company, East Fultonham, Ohio.
Georgia Vitrified Brick and Clay Company, Augusta, Georgia.
Graves Shale Paving Brick Company, Birmingham, Alabama.
Hydraulic Pressed Brick Company, St. Louis, Missouri.
Independence Brick Company, Independence, Kansas.
Indiana Paving Brick and Block Company, Indianapolis, Indiana.
Jamestown Paving Brick Company, Jamestown, New York.
Kelly Brick Company, Wm. P., Winder, Pennsylvania.
Los Angeles Pressed Brick Company, Los Angeles, California.
Mack Manufacturing Company, Philadelphia, Pennsylvania.
Martinsville Brick Company, Martinsville, Indiana.
Massillon Brick Company, Massillon, Ohio.
Michigan Vitrified Brick Company, Bay City, Michigan.
Noble Brick Company, Glenwood, Ohio.

Patten Clay Company, Patten, Pennsylvania.
Patterson Clay Products Company, Clearfield, Pennsylvania.
Pennsylvania Clay Company, Pittsburgh, Pennsylvania.
Pittsburg Vitrified Paving and Building Brick Company, Kansas City, Missouri.
Portsmouth Granite Brick Company, Firebrick, Kentucky.
Portsmouth Paving Brick Company, Portsmouth, Ohio.
Reynoldsville Brick and Tile Company, Reynoldsville, Pennsylvania.
Southern Clay Manufacturing Company, Chattanooga, Tennessee.
South Webster Brick and Tile Company, South Webster, Ohio.
Springfield Paving Brick Company, Springfield, Illinois.
Thurber Brick Company, Thurber, Texas.
Toronto Fire Clay Company, Toronto, Ohio.
Tulsa Brick Company, Tulsa, Oklahoma.
Tuna Valley Pressed Brick Company, Bradford, Pennsylvania.
Vulcan Brick Company, Wellsville, Ohio.
Watsontown Brick and Clay Products Company, Watsontown, Pennsylvania

Wood Block Paving Manufacturers

American Creosoting Company, Marion, Illinois.
American Creosoting Company, Newark, New Jersey.
Ayer and Lord Tie Company, Argenta, Arkansas.
Ayer and Lord Tie Company, Carbondale, Illinois.
Ayer and Lord Tie Company, Grenada, Mississippi.
Barber Asphalt Paving Company, Maurer, New Jersey.
Chicago Creosoting Company, Chicago, Illinois.
Colman Creosoting Company, Seattle, Washington.
Compressed Wood Preserving Company, The, Cincinnati, Ohio.
Creosoted Wood Block Paving Company, New Orleans, Louisiana.
Eppinger and Russell Company, Long Island City, New York.
Gulfport Creosoting Company, Gulfport, Mississippi.
International Creosote and Construction Company, Beaumont, Texas.
International Creosote and Construction Company, Texarkana, Texas.
Jennison Wright Company, Toledo, Ohio.
Kettle River Company, The, Madison, Illinois.
Kettle River Company, The, Sandstone, Minn.
National Lumber and Creosoting Company, Texarkana, Arkansas.
New Orleans Wood Preserving Company, New Orleans, Louisiana.
Pacific Creosoting Company, Eagle Harbor, Washington.
Puget Sound Wood Preserving Company, Lowell, Washington.
Republic Creosoting Company, Mobile, Alabama.
Republic Creosoting Company, Indianapolis, Indiana.
Republic Creosoting Company, Minneapolis, Minnesota.
St. Paul and Tacoma Lumber Company, Tacoma, Washington.
Shreveport Creosoting Company, Shreveport, Louisiana.
Southern Creosote Company, Ltd., Slidell, Louisiana.
Southern Wood Preserving Company, Atlanta, Georgia.
U. S. Wood Preserving Company, Norfolk, Virginia.
Wyckoff Pipe Creosoting Company, Portsmouth, Virginia.

National Lime Manufacturers Association

Officers.—William E. Carson, president, Riverton, Virginia; J. King McLanahan, Jr., first vice-president, Hollidaysburg, Pennsylvania, L. M. Palmer, Jr., second vice-president, New York, N. Y., George H. Nicholson, third vice-president, Manistique, Michigan; Fred. K. Irvine, secretary, Chicago, Illinois; C. W. S. Cobb, treasurer, St. Louis, Missouri.

Executive committee.—William E. Carson, ex-officio, Riverton, Virginia; Charles Warner, Wilmington, Delaware; L. Hitchcock, Cleveland, Ohio; W. M. Hunkins, St. Louis, Mo.

National Association of Cement Users

Officers.—Richard L. Humphrey, Philadelphia, Pennsylvania, president; Arthur N. Talbot, Urbana, Illinois, vice-president for two years; L. C. Wason, Boston, Massachusetts, vice-president for one year; H. C. Turner, New York, New York, treasurer; Edw. E. Krauss, Philadelphia, Pennsylvania, secretary.

Directors.—First District, W. L. Church, Boston, Massachusetts; Second District, E. D. Boyer, New York, New York; Third District, E. L. Rausonie, Dunellen, New Jersey; Fourth District, W. P. Anderson, Acumato, New Jersey; Fifth District, B. F. Affleck, Chicago, Illinois; Sixth District, Chas. Derlech, Berkeley, California.

National Association of Sand and Gravel Producers

Officers.—F. W. Renwick, Chicago Gravel Company, 343 S. Dearborn Street, Chicago, Illinois, president; H. H. Halliday, Halliday Sand Company, Cairo, Illinois, first vice-president; W. F. Bradley, Ohio and Michigan Sand and Gravel Company, Toledo, Ohio, second vice-president; H. F. Curtis, Lyman Sand Company, Omaha, Nebraska, third vice-president; Lee R. Witty, Wabash Sand and Gravel Company, Terre Haute, Indiana, fourth vice-president; J. J. Neary, Utica Fire Sand Company, Utica, Illinois, fifth vice-president; C. H. Brand, Atwood-Davis Sand Company, Chicago, Illinois, treasurer; Chas. D. Warner, Chicago, Illinois, secretary.

ROAD, BRIDGE AND STREET CONTRACTORS

Alabama

Road Contractors

Bearden, A. F.	Guin
Brown, J. G.	Montgomery
Cook & Company, D. R.	Selma
Dunn & Deland	Birmingham
Franklin & Goodwin	Birmingham
Goodrich & Crinkley	Anniston
Hicks, W. A., & Son	Seale
Jett Brothers	Mobile
Mullarky, J. L.	Cullman
Newell Brothers Contracting Company	Birmingham
Nixon & Smith	Wetumpka
Pearson & Bradford	Oneonta
Perry, Andrew	Montgomery
Pruett, O. J.	Montgomery
Stubbs, T. J	Birmingham
Wade, W. D.	Birmingham
Wallace Brothers & Young	Birmingham
Wright, J. W., Jr.	Brewton

Bridge Contractors

Austin Brothers	Atlanta, Ga.
Blodgett Construction Company	Kansas City, Mo.
Central Contracting Company	Birmingham, Ala.
Converse Bridge Company	Chattanooga, Tenn.
Finell Contracting Company	Tuscaloosa, Ala.
Hicks, W. A., & Son	Vernon, Ala.
Joliet Bridge & Iron Company	Memphis, Tenn.
Nashville Bridge Company	Nashville, Tenn.
Southern Bridge Company	Birmingham, Ala.
Tuscaloosa Concrete Company	Tuscaloosa, Ala.

Road, Street and Bridge Contractors

Duncan, C. O.	Gadsden
Gasden Concrete Company	Gadsden
Gordon, A. P.	Montgomery
Little, P. M.	Gadsden
Moon, R. P.	Gadsden
Mitchell, J. D.	Montgomery
Perry, A. E.	Montgomery
Stough, J. F	Montgomery
Supple Brothers	Montgomery
Vaughn, W. H.	Montgomery

Arkansas

Brownell, R. E.	Oklahoma City, Okla.
Levy & Levy	Muskogee, Okla.
Ratcliff-Gibson Contracting Company	Little Rock
Royce, E. C.	Pine Bluff
Shelby & Bateman	Little Rock
Smith, A. B.	Pine Bluff

California

Road Contractors

Bryant & Austin	Los Angeles
Burge, E. O.	Ceres
Burns, Clark & Da Roza	Sacramento
City Street Improvement Company, The	San Francisco
Clark & Henry Company, The	Stockton
Curtis & Company, M. L.	Cardiff-by-the-Sea
Frey, F. E.	Sacramento
General Contracting Corporation	San Francisco
Keatinge & Son, R.	San Francisco
Ransome-Crummey Company	Oakland
Ritchie & Company, F. R.	San Francisco
Rogers Brothers Company	Los Angeles
Teichert & Son, A.	Sacramento
Western Paving Company	San Francisco
Williamson, J. M.	Santa Barbara
Worswick Street Paving Company	Fresno

Bridge Contractors

Healy Tibbetts Company	San Francisco
Mervy & Elwell	San Francisco
The Pacific Construction Company	San Francisco
The San Francisco Bridge Company	San Francisco

Road, Street and Bridge Contractors

Anderson & Owens	Hydesville
Baldwin Construction Company	Pasadena
Barber Asphalt Company	San Francisco
Barber Asphalt Company	San Diego
Bates-Borland & Ayer	Oakland
Burge, E. O.	Sacramento
California Construction Company	Eureka
California Road & Street Improvement Company	Fresno
Chambers & Heafey	Oakland
Columbia Construction Company	Oakland
Contra Costa Construction Company	Berkeley
Dontanville, W. A.	Pasadena
Dunleavey, W. S.	Oakland
Elsemore & Jacobs	Eureka
Eureka Paving Company	Eureka
Fairchild-Hilmore & Wilton	San Diego
Fairchild-Hilmore & Wilton	Los Angeles
Federal Construction Company	San Francisco
Fenton, Henry	San Diego
Fraser, M., Company	Eureka

Frenzel, Ernest	Redlands
Gabrielson, E. G.	San Diego
Gillham, W. L., & Sons	San Jose
Goodbody, M. D.	San Diego
Haddock, J. E.	Pasadena
Hall & Hunt	Fresno
Haw, W. H.	Eureka
Highway Construction Company	San Bernardino
Hoare, P. H.	Oakland
Holloway, Andrew	Pasadena
Hutchinson Construction Company	Oakland
Hyde, C. L., Construction Company	San Diego
Johnson & Shea Company	Riverside
McElwaine, Charles	San Bernardino
McNair, James	San Bernardino
Matthieson, P.	Hayward
Mercereau Bridge & Construction Company	Los Angeles
Mervey-Elwell Company	Oakland
Moore, B. M.	Eureka
Oakland Paving Company	Oakland
Oxsen & McDonald	Pleasanton
Page, L. L.	San Pablo
Peterson & Wilson	Oakland
Powell Brothers Construction Company	Alameda
Reardon-Crist Company	Oakland
Russell, T. B.	Hayward
Schmidt, W. J.	Berkeley
Selvage, W. S.	Eureka
Shields & Company	San Diego
Smith, Frank	Eureka
Smith, F. L.	Eureka
Steffgen, Charles	San Diego
Stone, E. B. & A. L.	San Francisco
Thompson Brothers	Fresno
Ulrich & Howell	Modesto
Vincent, C. D.	San Francisco
White, Theodore	Hollywood
Williams-Belser Company	San Francisco

Colorado

Road Contractors

Allen & Maloney	Littleton, P. O. Box 84
Booth, Levi G., 231 Columbine Street	Denver
Boulder Concrete Works	Boulder
Browne, F. O., 1st and Larimer Streets	Denver
Burk & Vaughn	Castle Rock
Coleman, E. R.	La Veta
Colorado Construction Company	Denver
Colorado Engineering & Construction Company	Greeley
Colorado-Utah Construction Company, Majestic Building	Denver
Commonwealth Construction Company, Colorado Building	Denver
Dawson, C. D.	Olathe
Denver & Pueblo Construction Company, Railroad Building	Denver
Ford, Frank	Littleton
Fox & Babb, 905 8th Avenue	Greeley

Fox & Smith Construction Company	Florence
Gaffy & Keefe Construction Company, Exchange Building	Denver
Gittings, J. B.	Walsenburg
Heimbecher, C. F., & Brother, 515 15th Street	Denver
Herst & Koenig	Sterling
Hess & Son	Manassa
Holme & Allen Pipe & Construction Company, McPhee Building	Denver
Jenican, Henry, 330 Temple Court	Denver
Jenkins & Branson	Las Animas
Johnson, J. W.	Julesburg
Kelley, George A.	Hotchkiss
Kenefick-Quigley & Russell Construction Co., Century Building	Denver
Keys, Mr.	Idaho Springs
Kilpatrick Brothers Company, Railroad Building	Denver
Ladd-Sanger Contracting Company, Majestic Building	Denver
Larson, Chris	Hotchkiss
Levy Construction Company Commonwealth Building	Denver
Lumsden & Gordon	Canon City
Marshall-Murphy Construction Company	Las Animas
Miller, George	La Junta
Minneapolis Bridge Company	Denver
Missouri Valley Bridge Company	Denver
Morrison Construction Company	Denver
Municipal Construction Company, Jacobson Building	Denver
Murphy, Hugh, Nassau Block	Denver
National Construction Company, Empire Building	Denver
Newell & Kaufman, Emerson Street	Denver
O'Brien & Son, Nassau Building	Denver
Okumura, H. S., Railroad Building	Denver
Omaha Structural Steel Company	Omaha, Neb.
Osner, Joseph, 357 Broadway	Denver
Patterson, M. J., Contracting Company, Colorado Building	Denver
Phillips Construction Company, Railroad Building	Denver
Pinno, J. E.	Fort Morgan
Pueblo Bridge Company	Pueblo
Ruth-Flynn Construction Company, Boston Building	Denver
Seerie Brothers, Continental Building	Denver
Sheeley, The C. G., Contracting Company, Tabor Opera House	Denver
Standard Construction Company, Central Block	Pueblo
Stocker & Fraser, Colorado Building	Denver
Whitney-Steen Company, Symes Building	Denver
Williams & Williams	Golden
Zook & Makin	Erie

Road, Street and Bridge Contractors

Clinton Sons Company	Denver
Denver-Pueblo Construction Company	Denver
Dovenkamp, L.	Fort Morgan
Fields, Arthur	Pueblo
Dennis, Gibbons Construction Company	Denver
Lambie, C. S., Construction Company	Denver
Liggett, R. H.	Fort Morgan
McDonald, R. P., Construction Company	Denver
Mishou & Millard	Pueblo
Ripley & Leslie	Pueblo
Vickery-Foster & Doll	Denver

Connecticut

Road, Street and Bridge Contractors

Arrizoin Brothers	Middletown
Arthur, W. H.	Glenbrook
Arthur, W. H.	Stamford
Baef, Edward, Company	Hartford
Brault, Frank	Ansonia
Brazos, A., & Sons	Middletown
Brazos, Frank	New Haven
Briclyn & Sons	Enfield
Adams, Brown & Rustin	Springfield, Mass.
Curvan Corporation	Middletown
Daley, Robt. D.	New Haven
Davidson, John J.	Ansonia
Donhooe Brothers	Middletown
Hartford Paving & Construction Company	Hartford
Horne, C. E.	Mullbury, Mass.
Kane, Robt. E.	Menden
Kearney, Thos.	Menden
Kellogg, F. J.	Danbury
Lane Construction Company	Menden
Mahon, B. F.	New London
Mazotta, Salvator	Middletown
O'Connor Brothers	Stamford
Parsons, H. A.	Stamford
Pratt	Dalton
Redden, F. H., Construction Company	New London
Seezio, Leonardo	Menden
Slocum, C. H., & Company	Hartford
Speery Engineering Company	New Haven
Sternbery & Sons	West Hartford
Sweeney, L. F.	Danbury
Tryon, C. W.	Menden
Wardell, F. L.	Stamford
Wooster, Chas.	Ansonia
York Hill Trap Rock Quarry Company	Menden

Delaware

Road Contractors

Ambler-Davis Company, 14 S. Broad Street	Philadelphia, Pa.
Anderson, Joseph	Delaware City
Barber & Perring, Land Title Building	Philadelphia, Pa.
Borneman, F. W.	Landsdowne, Pa.
Borneman-Beitler Cons. Co., Inc., 1317 Land Title Bldg.	Philadelphia, Pa.
Chesapeake Construction Company	Preston, Md.
Clark, John A., 603 West 5th Street	Wilmington
Continental Public Works, 2 Rector Street	New York, N. Y.
Corcoran Construction Company	West Chester, Pa.
Davis, Wm. P., 413 Walnut Street	West Chester, Pa.
Delaware Granite & Mining Company	Wilmington
Doran, John F., 428 Marshall Street	Norristown, Pa.
Evans, W. C.	Ambler, Pa.
Francis, J. D.	Punxsutawney, Pa.
Frech, Geo. M.	Somerville, N. J.

Haigh, Arthur H., Post Office Building	Germantown, Pa.
Hanlon, John F., Company, Inc., 1335 Real Estate Bldg.	Philadelphia, Pa.
Harding, W. S.	Palnupa, N. J.
Heddon, E. J., 14 S. Broad Street	Philadelphia, Pa.
Hobelitz & Price	Meyersdale, Pa.
Horrigan Contracting Company, Ford Building	Wilmington
Juniata Paving Company, Empire Building	Philadelphia, Pa.
Latham, Fayette M., 1800 N. Charles Street	Baltimore, Md.
McClellan, William	Strafford, Pa.
Monroe Paving Company, Stephen Girard Building	Philadelphia, Pa.
Moore, H. P., & Company, 407 Sansom Street	Philadelphia, Pa.
Moore, H. P.	Narberth, Pa.
Mundy, Patrick J., 9 E. 4th Street	Wilmington
Nelson-Merydith Company	Chambersburg, Pa.
Nolan Brothers	Reading, Pa.
O'Connell, D. E.	Kennett Square, Pa.
O'Neal, John F.	Mt. Cuba
Snyder, George F., Company, 129 S. 5th Street	Philadelphia, Pa.
Stewart & Donohue	Wilmington
Stewart, J. F., 55th and Walnut Streets	Philadelphia, Pa.
Wickersham, B. F.	Kennett Square, Pa.
Williams, John J., & Company	Chester, Pa.

Florida

Road and Street Contractors

Collins, Phil	Tampa
Davis, R. L.	Tampa
Edwards Contracting Company	Tampa
Foster, Geo. R.	Jacksonville
Georgia Engineering Company	Augusta, Ga.
Paul, F. J.	Tampa
Wilson, Jas. Y.	Jacksonville

Georgia

Road Contractors

Austin Brothers	Atlanta
Bosworth, E. L.	Rome
Bowe, W. F.	Augusta
Dorn & Williams	Augusta
Gardiner & Pease	Columbia
Georgia Engineering Company	Augusta
Grafton, T. E.	Rome
Hankinson & Hagler	Augusta
Mitchell, W. H.	Rome
Twiggs, A. J., & Son	Augusta

Idaho

Road and Street Contractors

Farris, R. W., Construction Company	Boise
Gustafson, J.	Boise
Maney Brothers	Boise
Slick Brothers	Boise
Sunton, A. C.	Boise

Illinois

Road, Street and Bridge Contractors

American Asphalt Paving Company	Chicago
American Bridge Company	Chicago
Ascher, Wm.	Freeport
Baer, J.	Streator
Barr, A.	Urbana
Beardstown Concrete Construction Company	Beardstown
Berenz, Henry	Bloomington
Boals & Meinfield	Monmouth
Bretz, John E.	Springfield
Burham & Ives	Bloomington
Canterbury, R. J.	Peoria
Capitol City Concrete Construction Company	Springfield
Carrico, F. K.	Rockford
Charles, W. C.	Cairo
Cherry, J. W.	Jacksonville
Chicago Bridge & Iron Company	Chicago
Chicago Heights Coal Company	Chicago Heights
Citizens Construction Company	Chicago
Clough Concrete Construction Company	Quincy
Conway, R. F.	Chicago
Curdie & Manpin	Alton
Dandrea & Rossie	Chicago Heights
Degenhardt, Chas.	Alton
Egan, R. F.	Springfield
Eiff, Jas., & Son	Quincy
Fernondue & Sons	Jacksonville
Galvin, M.	Cairo
Gass, H. C.	Belleville
Goelitz, H. G.	Chicago
Gund-Graham Company	Freeport
Hanes & Son	Cairo
Hoeffkan Brothers	Belleville
Hoffman, Otis	Jacksonville
Holliday, W. R.	Cairo
Humndert, H. B.	Quincy
Hyman, D. A.	Logansport
Jacksonville Street Bridge Company	Jacksonville
Kenwood Bridge Company	Chicago
Lain, I. D.	Bloomington
Lord, E. A.	Monmouth
McAllister, John	Peoria
McElwell & Bushell	Peoria
McGary, Jno. A., & Company	Chicago
McGarrock Brothers Contracting Company	Chicago Heights
Marcus Bridge Works	Peoria
Marquette Construction Company	Chicago
Mehaffy, John E.	Quincy
Meyers, D. A.	Peoria
Michelman Steel Construction Company	Quincy
Monmouth Bridge & Manufacturing Company	Monmouth
Moore, J. B.	Logansport
Morava Construction Company	Chicago
Palmer, Geo. H., & Company	Logansport

Payne, Chas.	Waukegan
Porter, Chas. M.	Chicago
Pratt, John	Virginia
Reeb Brothers	Belleville
Rees, H. J.	Quincy
Rutledge, A. E.	Rockford
Ryan, David	Alton
Sackley, Jas. A.	Chicago
Schilling, John	Dolton
Serbian, Julius	Cairo
Shanahan, R. F.	Quincy
Simmons, Peter	Quincy
Smith, Sam	Streator
Smith & Brown	Chicago
Springfield Bridge & Iron Company	Springfield
Standard Paving Company	Chicago
Stewart, Jim	Freeport
Stipes, J. W.	Champaign
Strubel, John	Alton
Swartz, G.	Streator
Thatcher, D. A.	Chicago
Thompson, A. O.	Peoria
Todd, A. N.	Chicago
Tuckey, Richard	Monmouth
Watson, Lee	Cairo
Welch, Henry, & Son	Springfield
Western Bader Pipe Company	Monmouth
Western Road Tool Company	Monmouth
Williams, Roy	Cairo
Wolf, Riley	Alton
Wolf, S. V.	Alton

Road Contractors

Dunlap, O. M.	Edwardsville
Fentz, Edward	Highland
Magnuson, S. M.	Buda
Mulvill Brothers	Box 81, Alton
Oswald Brothers	Alhambra
Payne & Barr	Danville
Roetzlet & Chipman	Mt. Carmel
Toliver, W. R.	Noble
Walter, W. J.	Glencoe
Ward & Son, Andrew	Oak Glen

Bridge Contractors

Atlas Portland Cement Company, Corn Exchange Bank Building	Chicago
Beindorf & Coulter	Litchfield
Bell, Alex.	Morris
Blake, Walter	Appleton, Wis.
Blodgett Construction Company	Kansas City, Mo.
Brereton Cement Walk Company, 435 Mulberry Street	Galesburg
Brooks Construction Company, The, 2606 Elizabeth Avenue	Zion City
Brown, Bert L.	Manliys
Brucker Granitoid Company	Alton
Burns, J. H., 1116 E. Grand Avenue	Beloit, Wis.
Buser Concrete Construction Company	Mount Morris

Capperrune & Deyo	Bradford
Carden-Callahan Company, 1636 McCormick Building	Chicago
Chester, Charles	Shelbyville
Chicago A. Cement Company, 108 LaSalle Street	Chicago
Clough Brothers	Quincy
Cogan, Samuel J., 335 Old Colony Building	Chicago
Concrete Steel Construction Co., 1100 W. Washington St.,	East Peoria
Cooney, Ed.	Tremont
Continental Bridge Company, 557 Monadnock Block	Chicago
Corrugated Bar Company, 1823–29 Commercial Natl. Bank Bldg.,	Chicago
Curry, H. W.	Darlington, Wis.
Cutler & Yeagy	Gary, Ind.
Daly, Cornelius, 4240 Shaw Avenue	St. Louis, Mo.
Davis Ewing Concrete Company	Bloomington
Deason, Edward	De Soto
DeVere, John	Kankakee
Dodge & Company, F. W., 842 Monadnock Block	Chicago
Driscoll-McCalman Company	Decatur
Elkhart Bridge & Iron Company	Elkhart, Ind.
Enmark, A. H.	Lake Forest
Fardwell & Bristol, 510 3d National Bank Building	St. Louis, Mo.
Fish, L. E.	Shelbyville
Fitzsimmons, Frank, 1322 Whittier Avenue	Springfield
Fowler, Wm. J.	LaHarpe
Frye, Claude, 718 Calhoun Street	Macomb
Gallery, John K., 719 Chamber of Commerce Building	Chicago
Gary Construction Company	Gary, Ind.
Gass Brothers	Belleville
Gibbons, Thos. H.	College Corner, O.
Goggin, P. J., Construction Company	Arcola
Gould Construction Company, 413–423 Wellman Avenue,	Davenport, Iowa
Griffiths Iron Works, 23d and Papin Streets	St. Louis, Mo.
Hadley, Frank O., 814 Central National Bank Building	St. Louis, Mo.
Hall, Robert F., 1433–115 Adams Street	Chicago
Hartzell, F. T., care Lancaster Bridge Company	Galena
Harvey, John P.	Amboy
Holmes, Harry C.	Macomb
Hough, Wm. B., 98 Jackson Boulevard	Chicago
Hunt, L. F.	Decatur
Hyten G. R.	Edwardsville
Illinois Hydraulic Stone & Construction Company	Elgin
Illinois Steel Company, 115 Adams Street	Chicago
Illinois Steel Bridge Company	Jacksonville
International Steel & Iron Const. Co., 603 Furniture Bldg.,	Evansville, Ind.
Jansen & Zoeller	Perkin
Johnson, W. C.	Salem
Joliet Bridge Company	Joliet
Joliet Steel Construction Company	Joliet
Jones & Daughlin	Pittsburgh, Pa.
Judy & Cook	Mackinaw
Kershaw, S. P.	Kankakee
Kesler & Son, C. W.	Kerrick
Kimballton Construction Company	Atlantic, Iowa.
Klein, Joseph	Freeburg
LaSalle Engineering Company, 440 S. Dearborn Street	Chicago
Laws & Company, C. F.	Irving
Lawson, C. P.	Orion

Lehigh Cement Company, P. O. Box 1014	St. Louis, Mo.
Lesch & Co., H.	Washburn
McLaughlin, John J., 9 LaSalle Street	Chicago
McManus & Son	Princeton
Maddox & Whitlock	Fillmore
Magnuson, S. M.	Buda
Marquette Cement Company, Marquette Building	Chicago
Meehan, Arthur	Darlington, Wis.
Metal Concrete Chimney Company, Chemical Building	St. Louis, Mo.
Miller-Hey Construction Company	Waterloo, Iowa
Miller, Frank R., Room 222, Odd Fellows Building	Springfield
Miller & Borcehring, 304 Frisco Building	St. Louis, Mo.
Modern Steel Structural Company	Waukesha, Wis.
Morin & Co., Chas.	St. Anne
O'Heron, John, & Company, 6 Wabash Avenue	Chicago
Oswald Brothers	New Douglas
Neuhaus, Arthur, R. F. D. 1	Bethalto
Neuman & Schultte	Bethalto
Northwestern Construction Company	Davenport, Iowa
Paris Bridge Company	Paris
Patchett, W. L., 3675 Tesson Street	St. Louis, Mo.
Payne, Frank, Suite 318, Adams Building	Danville
Pfaff, Julius	Frankfort
Pitts & Dougherty, Box 533	Lockport
Quade, H. C., 1414 Thirteenth Street	Moline
Qualls & Austin	Hillsboro
Quinlan, Geo. A., 1321 53d Street	Chicago
Quinn, Oscar	Marseilles
Ratzlow, H. P., & Company	Tiffany, Wis.
Reynolds, Myron B., 702 Oxford Building	Chicago
Rochester Bridge Company, The	Rochester
Rock River Bridge Company	Oregon
Rudesill, J. T. W., First National Bank Building	East St. Louis, Mo.
Sabin, J. H., 506 Trust Building	Rockford
Sauber & Paulson	Lockport
Schlachter, Philip	Streator
Schmidt Construction Company, The, Y. M. C. A. Building	Peoria
Schultz, A. J.	Waterman
Shons, W. H.	Freeport
Sides, J. W.	Nokomis
Slater & Poirot	Belleville
Smith, Cliff	Hutsonville
Sprecht & Murphy	Bushnell
Stakemiller, B. B., 302 Commercial Building	Alton
Steelcrete Construction Company, 3444 LaSalle Street	Chicago
Steer, Elton	Wyoming
Stites, H. B., 1241 N. King's Highway	St. Louis, Mo.
Stocker Gravel & Artificial Stone Company	Highland
Thatcher, A. J.	Columbus, O.
Thompson & Company, H. B., 1014 Sharp Building	Kansas City, Mo.
Toledo-Massillon Bridge Company	Toledo, O.
Trunck D., O. G. Hiverley Company	Freeport
Turner Improvement Co., J. M., 309 Youngerman Bldg.	Des Moines, Iowa
Universal Portland Cement Company, 115 Adams Street	Chicago
Wallace, J. A.	Springfield
Wetherell, H. S.	Morgan Park
Wever & Son, C. A.	Clayton

Wheeler, John, Construction Company	Geneva
Windes & Marsh, 598 Birch Street	Winnetka
Woodward, L. L., 621 LaSalle Street	Ottawa
Wuellner & Son, J. J., 1119 Union Street	Alton

Indiana

Road, Street and Bridge Contractors

Ahlborn Construction Company	Hammon
Aikman, Peter	Dana
Barnes, Harry W	South Bend
Birch, Wm	Muncie
Burke & Durbin	Anderson
Cain, W. A	Gary
Carpenter, H. A	Cloverland
Chapman, G. R	Clinton
Cline & Moore	Muncie
Coleman, Henry	Logansport
Copp, C. S	South Bend
Cronin, J. F	Richmond
Cutler & Yeagy	Gary
Daniels-Lyst & Douglas	Anderson
Deferes, C. H	South Bend
Dreery, I. M	Richmond
Foster Construction Company	Richmond
Fougervouse, Frank	New Albany
Gary Construction Company	Gary
Guinnup, M. M	Muncie
Hines, Frank	Muncie
Hipskind, Jno	Richmond
Hobon & Roach	South Bend
Howe, Jno	New Albany
Ingram & Company	Hillsdale
Jester & Jester	Perrysville
Keefer & Bailey	Huntington
Kelly, T. P	Anderson
Kelly & Emeley	Bippus
Lavine Brothers Company	Hammond
Lyons & Delaney	Muncie
Metz & McVey	Gary
Neil & David Construction Company	Gary
Newhouse, Wm	New Albany
Palmer, Geo., & Company	Logansport
Rankert & Eggleton	Wishawaka
Reed, G. O	East Chicago
Schneider Brothers	Richmond
Shutt, L. A	Huntington
Slick, F. E	Richmond
Smith, I. E	Richmond
Smith, Selma	Gary
Sweeney, Wm. A	Jeffersonville
Sykes, Charley	Newport
Sykes, Geo. W	Dana
Thomas, Dan W	Dana
Terrence, Wm	Muncie
Walker, I. J	Huntington
Western Construction Company	Lafayette

Iowa

Road, Street and Bridge Contractors

Baker, R. F.	Oskaloosa
Berry, J. L.	Iowa City
Blunk, J. C.	Ottumwa
Bowen, S. R.	Mason City
Bradley, T.	Iowa City
Burlington Construction Company	Burlington
Carey, Thos., & Son	Clinton
Chilton, Chas.	Ottumwa
Clarke, P. V.	Clinton
Collins, G. S. C.	Sioux City
Dearborn & Jackson	Cedar Rapids
Dutton, Wm.	Boone
Elzy & Carlson	Marshalltown
Ford, M.	Cedar Rapids
Gabler, Geo.	Mason City
Guenther, F. W.	Burlington
Hahn, F.K.	Cedar Rapids
Hanlon, E. J.	Sioux City
Hansen, P. C., & Son	Sioux City
Hoar & Parkinson	Iowa City
Horrabin, Wm.	Iowa City
Iowa Cement Brick Company	Sioux City
Jensen & Krage	Sioux City
Lewis & Leeder	Sioux City
Peterson, Geo.	Burlington
Rink & Schnell	Clinton
Samuelson, E. H.	Boone
Smith, Percy P.	Cedar Rapids
Sweat, B. J.	Cedar Rapids
Thirn, M. L., Paving Company	Sioux City
Whitlatch, H. E.	Irving
Williams & Wisnell	New Sharon
Young & Buescher	Burlington

Bridge Contractors

Capital City Construction Company	Des Moines
Childs, L. B.	Nevada
Clinton Bridge & Iron Works	Clinton
Conn Construction Company	Boone
Cook Construction Company	Des Moines
Dannels & Son	Denison
Des Moines Bridge & Iron Works	Des Moines
Des Moines Engineering & Construction Company	Des Moines
Elkhart Bridge & Iron Works	Sioux City
Federal Bridge Company	Des Moines
Hinkel, Wm.	Mason City
Illinois Steel Bridge Company	Des Moines
Iowa Bridge Company	Des Moines
Kimballton Construction Company	Sioux City
Koss, Geo. W.	Sioux City
Lana Construction Company	Council Bluffs
Mahl, E. M., 823 W. Fifth Street	Des Moines
Marsh Engineering Company	Des Moines

Merrick, A. W	Boone
Miller-Hey Construction Company	Waterloo
Ottumwa Bridge Company	Ottumwa
Ottumwa Supply & Construction Company	Ottumwa
Riemer, C. F., & Son	Marshalltown
Shorthill Company	Marshalltown
Stark, N. M., & Company	Des Moines
Truesdale Brothers	Glidden
Ward & Weighton, 505 Iowa Building	Sioux City
Waterloo Construction Company	Waterloo
Williams, T. B	Coon Rapids
Younglove Construction Company	Sioux City

Kansas

Road Contractors

Acme Paving Crusher Company	Kansas City
Bennett, M. I	Leavenworth
Bowesman, D. P	Rosedale
Davidson Construction Company	Independence
Dobbins Roads & Construction Company	Pleasant Hill
Kelly, J.D	Overland Park
Petty, J. H	Paola
Ranson & Cook	Ottawa
Turner, Archie M	Rosedale

Bridge Contractors

Beatty Contracting Company	Blair, Nebr.
Blynn, D. H	Fredonia
Capital Iron Works	Topeka
Dailey & Beckelheimer	Carmi, Ill.
Deldine, E. L	Hannibal, Mo.
Deikmann, A. A., Box 173	Oskaloosa
Dill, Roy	Manhattan
Freeborn Engineering & Construction Co., Scarrit Bldg.	Kansas City, Mo.
French, W. L	Kansas City, Mo.
Green, R. R	El Dorado, Ill.
Illinois Steel Bridge Company	Kansas City, Mo.
Kansas City Bridge Company, Water Works Bldg	Kansas City, Mo.
Leavenworth Bridge Company	Leavenworth
McKenzie-Williams Construction Company	Webb City, Mo.
Marsh Bridge Company, 802 Equitable Building	Des Moines, Ia.
Midland Bridge Company, Gibraltar Building	Kansas City, Mo.
Missouri Valley Bridge Company	Leavenworth
Missouri Bridge & Iron Company	St. Louis, Mo.
Monarch Construction Company	Falls City, Nebr.
Moore, J. D., Contracting Company	North Topeka
Olson & Schmidt	St. Joseph, Mo.
Ottumwa Bridge Company	Ottumwa, Ia.
Smith, Marion	Durham
St. Louis Bridge & Iron Company	St. Louis, Mo.
Stupp Brothers	St. Louis, Mo.
Topeka Bridge & Iron Company	Topeka
Union Bridge & Construction Company	Kansas City, Mo.
Vincennes Bridge Company	Muskogee, Okla.
Western Bridge & Construction Company	Omaha, Nebr.
Wheeler, W. W	Iola

Road, Street and Bridge Contractors

Clements & Lavery	Coffeyville
Cleveland Trinidad Paving Company	Wichita
Deeter & Wenzel	Wichita
Holsey & Rice	St. Joseph, Mo.
Lester & Hudson	Coffeyville
McGuire & Stanton	Coffeyville
McGuire & Stanton	Wichita
McCune, Fred G.	Wichita
Miles, H. L.	Wichita
Nesh, H. R.	Pittsburg
Richie, Jno., & Sons	Wichita
Robson Construction Company	Pittsburg
Thogmartin & Gardner	Fort Scott
Yale, F. W., Construction Company	Coffeyville

Kentucky

Road Contractors

Central Construction Company	Lexington
Clark County Construction Company	Winchester
Gormley Brothers	Versailles
Home Construction Company	Lexington
Lexington Construction Company	Lexington
Luts, William	Lexington

Bridge Contractors

Bickel, Henry, Company, Garden and Walnut	Louisville
Bower, L.	Flemingsburg
Bracket Bridge Company	Cincinnati, O.
Champion Bridge Company	Wilmington, O.
Empire Bridge Company	Lexington
Fitch, C. F., Company, 146 N. 3d Street	Louisville
Hancock, L. W., Company, Lincoln Building	Louisville
Hegewald & Company, New Albany	Indiana
Louisville Bridge & Iron Company	Louisville
McClintic-Marshall Const. Co., Columbus Sav. & Tr. Bldg.,	Columbus, O.
Nashville Bridge Company	Nashville, Tenn.
National Concrete Company	Indianapolis, Ind.
Penn Bridge Company	Beaver Falls, Pa.
Pierce, Butler, 303 Norton Building	Louisville
Pursiful & Cawood	Pineville
Roanoke Bridge Company	Roanoke, Va.
Sullivan Bridge Company, South Main Street and I. C. R. R.,	Sullivan, Ind.
Vincennes Bridge Company	Vincennes, Ind.
Virginia Bridge Company	Roanoke, Va

Road, Street and Bridge Contractors

American Concrete Construction Company	Louisville
American Standard Asphalt Company	Louisville
Brickel Asphalt Paving Company	Louisville
Figg, L. L., Company	Louisville
Gonnell, G. W., Company	Louisville
Hanerck, L. W., Company	Louisville
Jefferson County Construction Company	Louisville
Larson, Edwin S.	Louisville
Louisville Asphalt Company	Louisville

Louisiana

Road, Street and Bridge Contractors

Alexander, L. F., Audubon Building	New Orleans
Allen, A. A.	Bayou Goula
American Developing Company, 908 Hennen Building	New Orleans
Anderson, John	Gulfport, Miss.
Barber Asphalt Company	New Orleans
Bancroft Brothers,	New Orleans
Barrow, B. F.	Marganza
Bell, J. R., 916 Hennen Building	New Orleans
Bettevy, M.	Marksville
Bowels & Kemingway	Jackson, Miss.
Brady, E. P., Macheca Building	New Orleans
Bush, W. B., care of F. Hargrave Company	Helena, Ark.
Buras, J. L.	Buras
Cavet, W. R., P. O. Box 312	Shreveport
Cheshire, R. L., 852 Dixon Avenue	Memphis, Tenn.
Clark, R. T.	Natchez, Miss.
Comerford, W. J., 427 Pennsylvania Street	New Orleans
Conrad, George H., 5005 Dauphine Street	New Orleans
Constant, Francis T., P. O. Box 220	Alexandria
Codifer, J. S.	Fort Adams, Miss.
Cullen, M.	Fort St. Phillip
Craven, J. A., & Company, 913 Hibernia Building	New Orleans
Dalgram, L. M., 218 Barronne Street	New Orleans
Donoven & Daley	Lake Providence
Doullut & Williams, Maison Blanche	New Orleans
Egan, Thomas, 4330 Canal St.	New Orleans
Egleston, Howard, 1910 Hibernia Building	New Orleans
Epple, George	Shreveport
Favret, L. F., 311 Barronne Street	New Orleans
Foster, J. G.	Bayou Goula
Frey, N., 1031 Decatur Street	New Orleans
Garbish, H. F	Vicksburg, Miss.
Garig, George W	Baton Rouge
Garsaud, Marcel, 2106 Tulane Avenue	New Orleans
Gibson, O. A.	Natchez, Miss.
Glassell Brothers	Belcher
Grasser Contracting Company, 912 Hennen Building	New Orleans
Heard, W. W	Baton Rouge
Hearin, D. B.	Baton Rouge
Helgason Brothers	Vicksburg, Miss.
Helperin & Nattin Construction Company	Shreveport
Hedberg, Herman, 4602 Perrier Street	New Orleans
Hicks Company	Shreveport
Hudson, C., Company	New Orleans
Hudson Construction Company	Alexandria
Hunt, M.	Shreveport
Hunter, S. S.	Shreveport
Huth Dredging Company	Franklin
Ivey, D. E.	Mer Rouge
Jackson, C. S.	Crowley
Jahncke Navigation Company, Howard Avenue	New Orleans
Jones, S. K.	Transylvania
Keegan, John J., Sons, 2824 Magazine Street	New Orleans

Kelley, George B., Tulane and Hagan Avenue	New Orleans
Knox, W. B.	Marianna, Ark.
Lacey Brothers	Arkansas City, Ark.
Lacey, T. H.	Baton Rouge
Lawrence Brothers	Rohwer, Ark.
Le Blanche, Alphonse	Sunshine
Linnan, M. L.	Baton Rouge
Lyons, P. H.	Nairo
McGinnis, Irwin	Alexandria
McHie, R. H.	Greenville
McKitrick, W. S., 1823 N. 11th Avenue	Nashville, Tenn.
McManus Brothers	Eros
Martin, Charles J., 1544 Allen Avenue	Shreveport
Mendelson, Chas., 339 Carondelet Street	New Orleans
Mitchell, M., 1400 Tulane Avenue	New Orleans
Mullen, W. C.	Vicksburg
Muse, T. E.	White Castle
Nattin, J. H.	Belcher
Neel, S. R.	Crossett, Ark.
Newman & Wilds	Venneer
Nicholson, Robert	Lake Providence
North Louisiana Construction Company	Benton
Patterson, A. L.	New Orleans
Parker, A. E.	Vicksburg
Peckham, A. N., Peoples Bank Building	New Orleans
Perrilliat, Arseme, 1007 Hibernia Building	New Orleans
Peterson, O. F., Sons & Company, 14 S. Canal Street	New Orleans
Picou, Wallace	McCall
Pratti, N., 2817 Onzaga Street	New Orleans
Pritchard, W. H., & Company	Natchez, Miss.
Reynolds, Hampton, 7823 Birch Street	New Orleans
Roache & Menegan	New Orleans
Roger, F. F., Grant Parish	How Cott
Rushing, W. M.	Bayou Current
Ryan, J. E., 4218 Iberville Street	New Orleans
Sessions, John G.	Van Buren, Ark.
Schnebelin, Adnois	Plaquemine
Scott, John, & Sons, Times Building	St. Louis, Mo.
Scott, N. G., Hennen Building	New Orleans
Shields, T. S.	Greenville, Miss.
Simms, J. M.	Alexandria
Smith, C. D., & Company, 1014 Memphis Trust Building	Memphis, Tenn.
Southern Paving & Contracting Company	New Orleans
Speed, C. F., 1452 Webster Avenue	New Orleans
Standard Paving & Contracting Company	New Orleans
Teche, The, Transportation & Fuel Company	Franklin
Thomas, A. J., 208 Hibernia Building	New Orleans
Williamson, Norris	Milliken
Willis & Lindhe, 506 Audubon Building	New Orleans
Wimbish, C. D.	Shreveport
Wyatt, W. A.	Natchez, Miss.
Wood, B. D., Whitney Central Bank Building	New Orleans

Maine

Road Contractors

Adams, Edward	North Andover, Mass.
Ahern Brothers	Willimantic, Conn.
American Truck Company	Kittery
Benedict, C. T.	Pittsfield
Berg, John A., Box 335	Brownville
Blome, Rudolph S., Company	Chicago, Ill.
Bryne, George M., & Company, 79 Milk Street	Boston, Mass.
Callan, L. H.	Bristol, R. I.
Carchia, L. C., 158 Salem Street	Boston, Mass.
Cinadella Brothers Company	Milford, Mass.
Clifford, John D.	Lewiston
Coleman Brothers., Pearl and Marginal Streets	Chelsea, Mass.
Coleman, J. C., & Sons, 1620 Tremont Street	Roxbury, Mass.
Commonwealth Construction Company, Times Building,	New York, City
Cressey, Walter, 178 Western Avenue	Gloucester, Mass.
Desantis P.	Presque Isle
Doherty James, 133 Calumet Street	Roxbury, Mass.
Du Pont de Nemours Powder Company, E. I.	Boston, Mass.
Dyan Supply Company, 510 Main Street	Cambridge, Mass.
Ellis, Fred E.	Melrose, Mass.
Fernald, George N., 1642 Forest Avenue	Woodfords
Gaffey, John A.	Medford, Mass.
Gill, John F., 92 Bonair Street	Winter Hill, Mass.
Gill, T. H., & Company	Winter Hill Station, Mass.
Goodwin, Roy C.	South Berwick
Gulliver, John W., 120 Exchange Street	Portland
Hassam Paving Company, 390 Main Street	Worcester, Mass.
Horne, Charles E.	Milbury, Mass.
Hudson, R. F., 19 Whittier Street	Melrose, Mass.
Lane Construction Corporation, 37 Colony Street	Meriden, Conn.
Ley, Fred T., Construction Company	Springfield, Mass.
Long, Joseph & Company	Leominster, Mass.
Lord, Edgar I.	Bar Harbor
McBride, H. M., 10 Winship Street	Brighton, Mass.
McDonough Company, M.	Swampscott, Mass.
McGanley, M. J., 2029 Columbia Avenue	Boston, Mass.
Maguire, F. G.	West Newton, Mass.
Martin & Condon	Watertown, Mass.
Monroe Paving Company, Betz Building	Philadelphia, Pa.
Moore, E. F.	Burlington, Vt.
Mullen, Luke D., 166 Devonshire Street	Boston, Mass.
Murray, Charles	Houlton
Neally, J. Barton, Company	Bangor
Nelson Auto Company	Bangor
New England Construction Company, 3½ Bellevue Street	Worcester, Mass.
Nolan, R. E., Box 26	Milton, N. H.
Northeastern Paving & Cons. Company, Court Square Bldg.	Portland
Nowell, Jas. C.	Franklin, N. H.
Polcaro, John W.	Pittsfield, Mass.

Road, Street and Bridge Contractors

Cunningham, F. W.	Portland
Fales & Simon	Rockland
Forgione & Romans	South Portland

Grady, Jno., & Sons	Bangor
Gulliver, Jno. W	Portland
Maine Trap Rock & Construction Company	Portland
Sawyer & Moulton	Portland

Maryland

Road Contractors

Andrews, S. S	Cambridge
Ault, D. V	Baltimore
Baker & Smith	East New Market
Barrett, T. J	Bordentown, N. J.
Bennett, M., & Sons	Indiana, Pa.
Brown, E. W	Port Deposit
Caroline Construction Company	Preston
Chesapeake Construction Company	Preston
Claiborne, Johnston & Company	Baltimore
Coblentz & Klipp	Frederick
Connolly, P. F	Boston, Mass.
Evans, W. E	Ambler, Pa.
Fisher & Carozza	Baltimore
Flanigan, P., & Sons	Baltimore
Forsythe, T. C	Belair
Francis, J. E	Punxsutawney, Pa.
Gonder, B. B	Strasburg, Pa.
Grove, M. J	Lime Kiln
Hassam Paving Company	Worcester, Mass.
Highway Construction Company	Frederick
Hoblitzell & Price	Meyersdale, Pa.
Holt Construction Company	Federalsburg
Jewel, George W	Annapolis
Juniata Paving Company	Philadelphia, Pa.
Lindsey, E. P	Portsmouth, Va.
Luck Construction Company	Roanoke, Va.
Luton Bridge Company	York, Pa.
Messenger, R. W	Federalsburg
Mullan, T	Baltimore
Phillips & Andrews	Hurlock
Reddington, P. F	Baltimore
Rickey-Swann Company	Trenton, N. J.
Roanoke Bridge Company	Roanoke, Va.
Robinson, I. G	Hollidaysburg, Pa.
Spencer, J. E	Aberdeen
Stehle & McGuckian	Annapolis
Sweeton, B. F., & Sons	Baltimore
Talbott, M. A., Company	Baltimore
Walsh, D. E	Westminster
Warren Brothers & Company	Boston, Mass.

Road, Street and Bridge Contractors

American Bridge Company of New York	Baltimore
Consolidated Engineering Company	Baltimore
Cunningham Paving & Construction Company	Baltimore
Elder Paving & Contracting Company	Baltimore
Filbert Paving & Contracting Company	Baltimore
Laner & Harper Company	Baltimore

Long, George, Contracting Company	Baltimore
Middleton, N. A., Company	Baltimore
Schneider, F. E., Paving Company	Baltimore
U. S. Asphalt Refining Company	Baltimore
Warren Ehret Company	Baltimore

Massachusetts

Road Contractors

Achenbach, U. U., 119 Broadway	Haverhill
Adams, Arthur A., 33 Lyman Street	Springfield
Adams, Edward	North Andover
Ahern, John F.	Willimantic, Conn.
American Construction & Concrete Company, 325 Old South Bldg	Boston
American Asphaltum & Rubber Company, 600 Harvester Bldg	Chicago, Ill.
Armor Concrete Construction Company, John Hancock Bldg.	Boston
Atkins, George A.	Palmer
Atlas Company, 832 Old South Building	Boston
Baker, Chas. I., 26 Hurlburt Street	Cambridge
Barnes & Ruffin Company, 218 Tremont Street	Boston
Barry, W. J., 31 Fernwood Road	Roxbury
Bartholomew, E. U	Sheffield
Barton, Cyrus, 78 S. Walker Street	Lowell
Batchelder, I. T.	North Reading
Beaver Construction Company, 195 Fern Street	Pittsfield
Bell Engineering & Construction Company, 229 Broadway	New York, City
Benedict, Olin T., 1266 North Street	Pittsfield
Berlin Construction Company	Berlin, Conn.
Biggs, D. M., & Company, 108 Marsh Street	Dorchester
Blakney, B.	(vicinity) Groton
Blood, W. H.	South Lancaster
Bradley, Michael A.	Blackstone
Briggs, G. U. (Buffalo Pitts Company)	Buffalo, N. Y.
Bridges Sons, Amos D., Inc.	Hazardville, Conn.
Bryne Contracting Company 46 School Street	Boston
Bruno, Thomas, 76 Vane Street	Revere
Blood, C. E., 32 Auburn Street	Springfield
Bullard, O. O.	Sterling
Burnett, H. & D., Franklin Park	Revere
Burnham & Poor	North Andover
Bush, Moller & Smith	Hartford, Conn.
Bush, Moller & Smith, 56 Congress Street	Boston
Callan, L. H., 208 Franklin Street	Bristol, R. I.
Camarco, Michael L.	Lee
Canney, A. W.	Croton-on-Hudson, N. Y.
Carchia, Antonio C.	Bournedale
Carchia, Luigi C., 16 Foster Street	Boston
Carr, G. W., Company, 518 Main Street	Worcester
Cashman Brothers	Newburyport
Cellilli, C. I., 303 Water Street	Springfield
Cenendella & Company	Milford
Chilson, D. L., & Company	Franklin
Coleman Brothers, 95 Milk Street	Boston
Coleman & Sons Company, J. C., 1620 Tremont Street	Roxbury
Collins, John	Newburyport
Collins & Ham, 119 Boston Street	South Boston

Condon & Martin	Watertown
Connecticut Trap Rock Quarries	Bridgeport, Conn.
Connolly Brothers	Beverly Farms
Connor Brothers	Lowell
Conroy, Thomas B	Woburn
Converse, H. P., & Company, 120 Milk Street	Boston
Cordner & Montague, 433 Bay Street	Springfield
Cressy, Walter	Gloucester
Crowe & Walsh	Pittsfield
Cullinan, Thomas F., Company, 48 Custom House Street	Providence, R. I.
Cushing, Herbert E, R. F. D	Seekonk
Cushing, P. P., 445 Washington Street	Dorchester
Dallesandro, Charles	Chester
Damon, David H	Ashby
Davis, W. T	Canton
DeMarco, Joseph, 130 Shrewsbury Street	Worcester
DeStephano, A., 61 Maverick square	East Boston
DeVito, J. A., Mystic Valley Parkway, corner Lakeview St.	West Medford
Eglee, Charles, & Company, John Hancock Building	Boston
Eichorn, F. H. 31 Astican Road	Forest Hills
Elkins, P. B., Company, 8 Beacon Street	Boston
Ellis, Fred E., Upham Street	Melrose
Evans, Joseph E	Windsor Locks, Conn.
Fannon, James H., 28 Hinckley Street	Somersville
Farinelli Brothers, Box 23	Hyde Park
Fay, Frank T., 50 Congress Street	Boston
Figenbaum, F.	Leominster
Fitzgerald, A. W	Marlboro
Flynt Granite Company	Monson
French, Walter S	Moorestown, N. J.
Gaffey, John A	Medford
Galle, C. D., 326 North Street	Boston
Gilbert, F., 326 North Street	Boston
Gill, John F., Company, Winter Hill	Somerville
Giovannini, P. F., 424 Hanover Street	Boston
Globe Construction Company, Old South Building	Boston
Gross, W. H., Company, 54 Kilby Street	Boston
Hailes & Harris, 55 Bensen Building	Albany, N. Y.
Hamlin & Ryan	Salem
Hammond, D., & Brother	Pittsfield
Hammond, F. W	Beverly
Hanscomb, H. A., Monument Street	West Medford
Hassam Paving Company, 311 Main Street	Worcester
Hastings, F. B., 122 Bank Street	Bridgeport, Conn.
Hennebique Construction Company, 46 Cornhill	Boston
Herr & Raftus, 130 Broadway	South Boston
Hodges, Arthur, 147 Milk Street	Boston
Holbrook, Cabot & Rollins	Boston
Horne, Charles E.	Milbury
Hub Construction Company, 163 Harrishef Street	Roxbury
Hudson, Richmond F., 19 Whittier Street	Melrose
Jenks-Williams Paving Company, Room 1, Walker Building	Worcester
Johnston, James H., 17 Boardman Street	Newburyport
Jones & Porcaro	Willimantic, Conn.
Keith, Warren R., 1489 Main Street	Campello
Kenney, Michael, 553 Cambridge Street	Worcester

Kernan, J. W., Highland Club	Lowell
Kettle Brook Stone Company, 96 Stafford Street	Worcester
Killorin Contracting Company, 6 Walnut Street	Wakefield
Kitfield, E. H., 46 Cornhill	Boston
Lane Construction Corporation	Meriden, Conn.
Lane Quarry Company	Hingham
Leach, C. N., P. O. Box 2285	Boston
Leadbetter, G. E., & Sons, 6 Cottage Street	Leominster
Letteney, John H., 101 Tremont Street	Boston
Ley Construction Company	Springfield
Lineham, John	Beverly Farms
Long, Joseph, & Company	Leominster
Loud, W.F., & Sons	Quincy
McCarthy Brothers	Franklin
McCusker, J. H.	Waltham
McCormick, Joseph, 315 Taunton Avenue	East Providence, R. I.
McDonough, Michael	Swampscott
McGill & Comiskey	Dover
McGovern, James, Adams Street	Dorchester
McGrath, J. A. & J. H., 18 Masonic Street	Northampton
Mague, Francis J.	West Newton
Mascetti & Holley, 72 Main Street	Torrington, Conn.
Mayo, Roland L.	Orleans, N. Y.
Micheline, A.	Reading
Monarch Machinery Company, 30 Church Street	New York City
Monroe Paving Company, 509 Betz Building	Philadelphia, Pa.
Morley-Flatley & Company	Manchester
Morse, R. A., Box 477	Ayer
Mullen, Luke D.	Boston
New England Contracting Company, 9 Bellevue Street	Worcester
Newell, R. H., & Company	Uxbridge
Norton, Henry L.	Springfield
O'Connell, Daniel, & Sons	Holyoke
O'Neil, Thomas F.	Newburyport
Orlando, William	Belchertown
Osgood Construction Company, 25 E. Hollis Street	Nashua, N. H.
Palmer, John B., Room 1012, Old South Building	Boston
Parsons, Joseph M., & Company	Salem
Peer, H. I.	Great Barrington
Pennock, Theo., Hotel Essex	Boston
Perrini, B.	Ashland
Perry, David T.	West Brattleboro, Vt.
Perry, A. D.	Brattleboro, Vt.
Pevear, Everett S., 224 Sea Street	East Lynn
Power Brothers, 512 Montello Street	Brockton
Pratt, W. R.	Dalton
Quinn, T. J.	Ashton, R. I.
Rendle, Geo. T.	Boston
Renfrew, Robt. W. J.	Pittsfield
Roach, Thos. N.	Chicago, Ill.
Ross & Fowler	Boston
Rossie, Ceasai A.	Torrington, Conn.
Rourke, E. J.	Abington
Rourke, Jno. J.	Lynn
Rowe Construction Company	Melrose
Sanborn, C. H., 162 St. Botolph Street	Boston
Saucier, Auguste	South Framingham

Sears, William	East Dennis
Seymour & Newell, Whitney Building	Springfield
Shanahan, R. D., Crawford House	Boston
Sharples, P. P., 297 Franklin Street	Boston
Shea, W., & Son	West Quincy
Sheehan, John & Son	Lynn
Simpson Brothers Corporation	Boston
Smith, Edward F., 20 Plymouth Street	Worcester
Snow, Charles W.	Truro
Snow & Farrington	Wrentham
Stadil, E. A., 232 Sand View Avenue	Stamford, Conn.
Stuart, T., & Sons Company, 22 Pearl Street	Newton
Tarbell, Harvey W.	Lowell
Thew Automatic Shovel Company, The	Lorain, O.
Thomas, Herbert L., Centre Street	Middleboro
Tomasello, Csr. A. G., 69 Gibson Street	Boston
Trumbull, C. E., 1121 Tremont Building	Boston
Tuttle & Edgerly	Swampscott
United Paving Company	Atlantic City, N. J.
Walker, Loring B.	Clinton
Ware, John, 18 Ash Street	Cambridge
Watkins, James E.	Amesbury
Welch, James J., 14 Bridge Street	Salem
Wellington, A. J., 235 Franklin Street	Boston
Whipple, R. O., Company, 306 Main Street	Worcester
Whiting, H. E., 2 Central Square	Cambridge
Winslow, F. I., 49 City Hall	Boston
Wood, H. C., Company	Westfield
Worcester Broken Stone Company, 21 Adams Street	Worcester
Young, H. E..	Bedford

Bridge Contractors

Breglio, P. A., Contracting Company, 164 Dwight Street	Springfield
Ley Construction Company	Springfield
New England Foundation Company, 1142 Tremont Building	Boston
New Jersey-West Virginia Bridge Company, 949 Broadway	New York City
Schenermann & Peck, 100 State Street	Albany, N. Y.
529 State Mutual Building	Worcester
Thompson, A. D., 101 Y. M. C. A. Building	Peoria, Ill.

Road, Street and Bridge Contractors

Barber Asphalt Paving Company	Boston
Barton, Cyrus	Lowell
Birnie, Adams Ruxton	Springfield
Coleman Brothers	Chelsea
Coleman, J. C., & Sons Company	Boston
Doherty, Jas.	Boston
Eastern Bridge & Street Contracting Company	Worcester
Ellis, W. H.	Boston
Fitzgerald, J. J.	Winchester
Store, F. S. & A. D.	Boston
Hauscom Construction Company	Boston
Harding, F. R.	Lee
Heapley, H. W.	Lee
Heapley, Wm. A.	Lee

Kane, M. J.	Worcester
Larywin, Aime	South Bridge
McGuire, H. J.	Worcester
Nawn, Harry	Boston
Pitman & Brown	Salem
Rendle & Stoddard	Boston
Rox, W., Trap Rock Company	Boston
Vanity, Charles	Lee
Ward, Wm. H., & Company	Lowell
Warren Brothers Company	Boston

Michigan

Road Contractors

Bean & Jones	Benton Harbor
Blanchard, C. H.	Roscommon
Fausey, Amos	Hastings
Geeck, Andrew, 523 Ada Street	Owosso
Good Roads Construction Company	Port Huron
Hauser, Fred	Hanover
Mitchell, Thomas	Battle Creek
Noger, H. H.	Temperance
Overman, A. T.	St. Joseph
Kneal & Ryan	Lansing

Road, Street and Bridge Contractors

Bichler Brothers	Groos
Boyes, D. W.	Grand Rapids
Bristol, G. F.	Grand Rapids
Carpenter & Anderson	Grand Rapids
Delta Contracting Company	Escanaba
Globe Construction Company	Kalamazoo
Haxie, H. A.	Grand Rapids
Heysteck, R.	Kalamazoo
Kloote, John	Grand Rapids
McDermott & Cooper	Grand Rapids
Prange, A. H.	Grand Rapids
Rusche, J. P.	Grand Rapids
Shoemaker, F. S.	Kalamazoo
Vander Horst, H. L.	Kalamazoo
Vander Veen, Peter	Grand Rapids

Minnesota

Road Contractors

Adams, S. H.	Ogema
Baldwin, Judge	Frazee
Benner, Matt	Wabasha
Brown, Chas.	Red Wing
Cater, W. F.	Haven
Cater, Frank, & Son	Haven
Eleffson, Elef	Becker
Eleffson, Jens	Becker
Foster, Geo.	Kellogg
Frye, W. A.	Elk River
Gilmore, Jno.	Brainerd

Glidden, Sam	Elk River
Hoff, Wm	Red Wing
Jenson, Wm	Wabasha
Johnson, Torkle	Clear Lake
Judge, S. T	Elk River
Leatherman, Abe	Plainview
Longoor, J. W	Red Wing
Lund, Silas	Onamia
McCave, Jno	Mazeppa
McFarland, Robt	Plainview
Micckow, Jno	Millville
Olson, Adolph	Cove
Resiter, Jno	Wabasha
Robson & Tubbesing	Red Wing
Schmitt, W. L	Lake City
Schmitz, Barney	Wabasso
Scholberg, Louis	Princeton
Schurhammer, Christ	Wabasha
Soule, Bert	Clear Lake
Stoddard, Chas	Canby
Thomas, F. W	Malaca
Thompson & Anderson	Brainerd
Tinkham Brothers	Elk River
Tonder, Mark	Dumfried
Wiceen, Louis	Princeton

Street and Bridge Contractors

Adolphson, Edward	Aitkin
Ames, Wylie	Alida
Aune, Jno	Mallard
Anderson, A G	Greenleaf
Anderson, Chas	St. Peter
Anderson, Jno., Company	St. James
Bayne, A. Y., Bridge Company	Rochester
Beebe, H. J	New Auburn
Beebe, U	Lake City
Behrens, Peter	Mahnomen
Benson, Sam	Blackduck
Berle, Geo	Henderson
Boelter, Adolph	Gibbon
Boelter, Julius	Henderson
Bowen, W. L	Lake City
Brasel, Jas	Green Isle
Brogan, Jno. S	St. Peter
Brobold, Ole	Shevlin
Brown, David	Kimball
Carlson, Jno	Kelliher
Carlson Brothers	St. Peter
Carter, L. D	Zimmerman
Casey, Jas	Prior Lake
Casey, Robt	Benson
Catour, Nick	Forrest City
Cenners, Louis	Cloquet
Chadburne, W. F	Elk River
Chandonnet, Thos	Wauburn
Chase, Jno	Chatfield

Chase, Jerry	Rochester
Christofferson, Christ	Bagley
Collins, Stece	Pillager
Conners, Con	Green Isle
Coffin, A.	Litchfield
Crommelt, Wm.	Pine River
Curron, Mike	Gaylord
Curtice & Curry	Litchfield
Dean, Fred	New Auburn
Devereaux, Wm. T.	Park Rapids
Doerr, Henry	Henderson
Dolan, Ted	Benson
Donivan, Jas	Green Isle
Durkee, E. E.	Cloquet
Eckhart, Joe	Gibbon
Elliott, W. H.	Plainview
Everett & Hitch	Brainerd
Eye, Jno	Redwood
Falconner, D. M.	Aitkin
Falstad & Son	Lake Wilson
Feller, Anton	Dassell
Fierer, Geo	Comfrey
Foley, E. H.	Zimmerman
Forland, G. A.	Bagley
Fosdyhe, Mr.	Benson
Fuller, W. L.	New Auburn
Fulton, E. R.	Marshall
Gibbs, Clifford	New Auburn
Gove, E. L.	Madelia
Gove, C. W	Wimdom
Greer, Richard	Zumbro Falls
Halverson, O. Le	Bagley
Halverson, Henry	Dawson
Hardy, Ed	Dassell
Hart, R. B.	Mallard
Hartman, Jno	Kelliher
Hawley, Jno	Greenleaf
Hawk & Hurley	Fulda
Hill, W. H.	Bagley
Howe, W. G.	Glencoe
Huntington, W. D.	Glencoe
Jacobson, I. G.	Madison
Jaeger, Richard	Winthrop
Jenson Brothers	Clearbrook
Jenson, Ole	Bagley
Johnson, Chas	Anoka
Johnson, E.	Watertown
Kaliher & King	Princeton
Keeler, A.	Anoka
Keogh, Jno	St. Peter
Koehne, Fred	Sleepy Eye
Kruse, F. A.	Benson
Lano, J.	Chaska
Larson, Albert	Clear Lake
Larson, L. J.	Winthrop
Leefe, Emil	Lake City
Lennon, Wm.	Kelliher

LeRoy, H. B.	Benson
Lindgren, Victor	Leonard
Looney & Wallace	Zimmerman
Lunde, Ole	Walker
McCormick, C. H	Wahkon
McMahanan, M. J	Green Isle
McKinnon, Naish	Bemidji
Mack, Pat	Green Isle
Malmo, Ole	Gonvick
Mason, S. O	Redwood Falls
Matison, Monis	Redwood Falls
Miller, Jas	Bemidji
Minneapolis S. & M. Company	Minneapolis
Moberg, Jno	Bemidji
Mongon, Thos	Green Isle
Nagle, Martin	Arlington
Nason, E	Duane
Nelson, Jno	Forest Prairie
Nelson, Peter	Milaca
Newquist, Emil	Carlton
Noble, Ross	Blackduck
Northern Cement Construction Company	Princeton
Olson Brothers	Gonvick
Osburne, Frank	Nicollet
Olson & Tully	Aitkin
Piek & Son	Slayton
Purcell, Chas	Green Isle
Quitberg, A. C	Clearbrook
Read, Ralph	Milville
Reed, A. H., Jr	Glencoe
Reuffs & Pleeghaar	Cologne
Ring, O. J	Gonvick
Ritari Brothers	Brainerd
Rochester Iron Works	Rochester
Rodeelske, Wm	Winthrop
Roland, Wm	Stewart
Samuelson, J	Watertown
Schiler, E. S	Cloquet
Schweppe, A. W	St. James
Schegrud N. H	Bagley
Siebrasse, Ed	Redwing
Silvernale & Lindberg	Curry
Smart, Tom	Bemidji
Soefker, Louis	Arlington
Soefker, Jno	Arlington
Sorenson, T. T	Bagley
Sizer, M	St. James
Sperry, Eric	Anoka
Stender, Aug. G	Young America
Sullivan, Tim	Dassell
Tews, Albert	Hutchinson
Tierney, Thos	Arlington
Trondson & Whitting	Blackduck
Turtleloots, M	Elk River
Tyrrell, E. O	Bachus
Vaugh, J. F	Brainerd

Road, Street and Bridge Contractors

Butler, C. C.	Virginia
Charland, Geo.	Mankato
Clough, D. H., & Company	Duluth
Coughlan, T. R.	Mankato
Dahl, E. A.	Duluth
Eklund, Chas., & Company	Duluth
Fowler & Ray	Mankato
General Contracting Company	Minneapolis
Johnson Brothers	Mankato
Johnson, J. A.	Duluth
Johnson & Erickson	Duluth
King, Geo. R.	Duluth
McDonnell, P.	Duluth
McLean, C. R.	Duluth
Nelson Brothers Company	Minneapolis
North Star Concrete Company	Mankato
Steele, Hugh	Duluth

Missouri

Road Contractors

Bicknell, John	Columbia
Bituminized Road Company, 417 Reliance Building	Kansas City
Columbia Paving Company	Columbia
Farley, E. G.	Baring
Fellows, J. H.	Columbia
Foner, S. A. (Webb City-Joplin Concrete Supply Company)	Webb City
Garrell, J. B.	Sedalia
Hall, M. F.	Clinton
Hood, Albert, 331 West Sea Avenue	Independence
Johnson & Hyatt	Sedalia
Kansa,s City Material Company, 320 Scaritt Building	Kansas City
Lynch John E.	Moberly
Mann-Smith Supply Company	St. Joseph
Murray Construction Company	Sikeston
Newland, Thomas	Fulton
Pope, Joseph	Jefferson City
Randall & Hood	Independence
Rust, Marshall	Boonville
Stewart, J. A.	Columbia
Webb City-Joplin Concrete Supply Company	Webb City
Wilson, J. F., 3329 Paseo	Kansas City
Winter, M. L.	Joplin

Road, Street and Bridge Contractors

Canton Bridge Company	Kansas City
Carmichael & Company	Kansas City
Cleveland Trinidad Paving Company	Kansas City
Decatur Bridge Company	Paris
Harte, Wm.	Kansas City
Jaickes, A., & Company	Kansas City
Lynch Construction Company	Moberly
McKenzie-Williams Construction Company	Webb City
Maret & Anthony	Webb City

Mense, A. R.	Kansas City
Midland Bridge Company	Kansas City
Mullins, N. C.	Kansas City
Pan-American Bridge Company	Moberly
Pope, Jos.	Jefferson City
Schreer, Wm.	Jefferson City
Thompson, H. H.	Kansas City
Washington, P., Company	Kansas City
Webb City Granolithic Company	Webb City
Webb City Paving Company	Webb City
Welsh, G. E.	Kansas City
Wolff, Fred	Jefferson City

Montana

Road Contractors

Adami Brothers	Helena
Johnson, Lewis	Helena
Kirkendall, Thomas	Helena
Nilson-Smith Company, 1st Avenue & Great Northern Tracks	Great Falls

Road, Street and Bridge Contractors

Dietrich, Geo., Paving Company	Seattle, Wash.
Harrington, J. F.	Missoula
Mirade-Tripp Concrete Company	Helena
Nash, G. H.	Missoula
Peppard, E. O.	Missoula
Smitte & Davis	Helena

Nebraska

Bridge Contractors

Canton Bridge Company	Omaha
Hastings Foundry & Iron Works	Hastings
Illinois Bridge Company	Omaha
Inter-Mountain Bridge & Construction Company	Tecumseh
Omaha Structural Steel Works	Omaha
Standard Bridge Company	Omaha
Western Bridge & Construction Company	Omaha

Road Contractors

Atrer, A. A.	Omaha
Beaty, E. S.	Blair
Byrne, Harry S.	Omaha
Collier Construction Company	Fairbury
Concrete Engineering Company	Omaha
Dobson & Breck	Lincoln
Elkhorn Construction Company	Fremont
Freeman, F. L.	Tecumseh
Midwest Engineering Company	Omaha
Monarch Engineering Company	Falls City
Mool, Harry W., & Company	Omaha
Mullen, E. L.	Lincoln
Nebraska Construction Company	Lincoln
Ward, H. T., & Company	Lincoln
Western Contractor Supply Company	Omaha
Williams, J. F.	Scottsbluff

Road, Street and Bridge Contractors

Fanning, Chas. E.	Omaha
Ford Paving Company	South Omaha
Hannon, Dan	South Omaha
Murphy, Hugh	Omaha
National Construction Company	Omaha
Sacks, Jas.	South Omaha

Nevada

Road Contractors

Ambrose, C. A.	Carson City
Boyle, John	Wadsworth
Burt & Wignall	Wadsworth
Conway, P. J.	Sweetwater
Davis, Perry	Reno
Enkhouse, Jos.	Reno
Maxey, J. H.	Susanville, Calif.
Morton, D. A.	Carson City
Niedt, A. F.	Reno
Reno Construction Company	Reno
Sales, A. L.	Gerlach
Stephenson, Sheppard & Wade	Fallon
Waths, L. R., & Company	Wadsworth
Wittenburg, C. F.	Tonopah

New Hampshire

Road Contractors

Adams, Edward	North Andover, Mass.
Ahern Brothers	Norwick, Conn.
Bailey, Charles A.	Suncook
Caughey, George H.	Waltham, Mass.
Cavanaugh, J. A.	Manchester
Coleman Brothers	Chelsea, Mass.
Cressy, Walter	Gloucester, Mass.
Darena, Marciano, 24 Battery Street	Boston, Mass.
Ellis, Fred E.	Peabody, Mass.
Fannon, Jas. H., 28 Hinckley Street	Somerville, Mass.
Gaffey, John A.	Medford, Mass.
Hill, Nat. W., 220 Broadway	New York, N. Y.
Hub Contracting Company, 103 Beverly Street	Boston, Mass.
Hudson, Richmond F., 18 Baster Street	Melrose, Mass.
Jewell, W. W.	Gorham
Killorin Construction Company	Wakefield, Mass.
Lane Construction Corporation	Meriden, Conn.
Mague, Francis J.	West Newton, Mass.
Martin & Condon, 84 Palfrey Street	Waterton, Mass.
Massachusetts Broken Stone Company, 235 Franklin Street	Boston, Mass.
North East Metal Company	Nashua
O'Hara, Charles E.	Gorham
Osgood Construction Company	Nashua
Penn Metal Company	Boston, Mass.
Perry, D. T., & Sons	West Brattleboro, Vt.
Poor, Willard H.	North Andover, Mass.
Rourke, E. J.	Abington, Mass.

Stewart & Snodgrass	Merlin
Stowers, Fred A.	Methuen, Mass.
Tilton, S. D.	Woodsville
Tuttle, H. S., & Company	Middlesboro, Mass.
United Construction Company	Albany, N. Y.
Watkins, James E.	Amesbury, Mass.

Road, Street and Bridge Contractors

Clark, L. D.	Laconia
Fitzgibbon & Dolan	Beverly, Mass.
Marcello, Jas.	Portsmouth
Pike, L. M., & Son	Laconia
Scrutton, L. E.	Portsmouth
Shea, P. D.	Portsmouth
Spinney, A. E.	Eliot, Me.
Woods, Wm.	Laconia

New Jersey

Road, Street and Bridge Contractors

Cogan, C. J.	Bayonne
Corson, W. P.	Camden
Donovan, Dan'l	Bayonne
Faughman, Patrick	Elizabeth
Jackson, Wm., & Son	Newark
Jannarone, Philip & Peter	Newark
Jelin, Abraham	New Brunswick
Jersey Paving Corporation	Newark
Kelly & McFerly	Camden
McCabe Brothers	Bayonne
McMahon Construction Company	Newark
McGovern, J. F.	New Brunswick
Mullin, E. M., & Company	Bayonne
Newark Paving Company	Newark
O'Gara & McGuire	Newark
O'Hagan, Michael	Phillipsburg
O'Neil, J. J.	Elizabeth
Phillipsburg Supply Company	Phillipsburg
Potts, J. J.	Elizabeth
Riddle, T. H.	New Brunswick
Salmon Brothers	Netcong
Sampson, Samuel	Elizabeth
Shanley, J. F., Company	Newark
Salott, Conrad	New Brunswick
Standard Bitulithic Company	Newark
Ten Broeck-Morse Eddy Company	Bayonne
Van Kenren & Son	Newark
Viscount, T.	Elizabeth
Ward, Aaron	Camden

New York

Road Contractors

Aetna Contracting Company, care W. W. Whyard	Nyack
Aetna Engineering & Contracting Company	Herkimer
Aikenhead, Bailey & Donaldson, 331 Powers Building	Rochester
Almahar Construction Company, 100 State Street	Albany

Anderson, James	Brushton
Arnold & Shearer, Box 267	Albany
Atlanta Construction Company	Atlanta
Baker, E. D., 27 Broome Street	Binghamton
Baker, H. L.	Cambridge, Mass.
Banebrick, John	Gasport
Bankers Surety Company	
Barber Asphalt & Paving Company, Land Title Building, Philadelphia, Pa.	
Bardol, F. V. E., D. S. Morgan Building	Buffalo
Beck, Edwin T.	Warren, Pa.
Beebe Brothers	Keene Valley
Begent, Fred W.	Newport
Benedict, O. T.	Pittsfield, Mass.
Bennett, W. E., Viaduct Street	Lanesboro, Pa.
Benson, S. T., & Company	Falconer
Beskin, Samuel, Bestman Street	Fishkill Lodge
Boyce, Jos. B., 9 Jackson Avenue	Long Island City
Boynton & McNally, Windsor Hotel	Elizabethtown
Boynton, Kellogg	Keesville
Brayer Brothers, 2 Smith Block	Auburn
Breese Construction Company, 100 Lake Street	Elmira
Brewer, A. C.	Oriskany Falls
Bridgeport Construction Company	Poughkeepsie
Bridges, A. D., Sons	Hazardville, Conn.
Brooks, James G., Powers Building	Rochester
Brooke & Julian, Powers Building	Rochester
Brotsch, Frank V., Company, Ellwanger & Barry Building	Rochester
Brotsch, F. A., Jr., Triangle Building	Rochester
Brown & Lowe Company, 111 Foster Avenue	Schenectady
Buckley Construction Company	Plattsburg
Bunce, H. E., & Company, 135 Fulton Street	Olean
Burgard, Henry P., Company, 275 Lathrap Street	Buffalo
Burnham, W. A., & Company	Glens Falls
Burns, W. J., Company, 421 Bastable Building	Syracuse
Burns & McCowville	Ogdensburg
Burns Brothers & Haley, Savings Bank Building	Watertown
Busch & Percival, 523 Brisbane Building	Buffalo
Catskill Construction Company	Catskill
Catskill Supply Company	Catskill
Central City Paving Company, 213 Kirk Building	Syracuse
Chambers & Barnes, 315 Powers Building	Rochester
Chambers & Truesdale, 315 Powers Building	Rochester
Clancey & Van Alst	Long Island City
Cohen, Frank L., 49 Niagara Street	Buffalo
Coleman Brothers, Washington Street	Boston, Mass.
Cold Spring Construction Company	Buffalo
Conley, F. D., 338 E. State Street	Ithaca
Connolly, P. F., Company	Chemung
Connors, Jos. H.	Fulton
Conroy & Nixdorf, 25 William Street	Oneida
Consalus, John E., 50 State Street	Albany
Constantine Construction Company, 528 West Avenue	Buffalo
Cooper, H. B., 326 State Street	Albany
Cooper, R. D., & Company, 513 Main Street	Little Falls
Cooper, Snell Company	Little Falls
Corliss Construction Company, Laundry Place	Troy
Coughlin & N. Lowman	Elmira

County Construction Company	Troy
Cowhig, W. J.	Albany
Creeden & Pitou	New York City
Criswell & Mallery	West Coxsackie
Crowe & Walsh, 311 North Street	Pittsfield, Mass.
Culker, J. A., Company	Oswego
Cuozzo, Jos. L.	Yonkers
Dale Engineering Company, 249 Genesee Street	Utica
DeGraff & Hogeboom, 130 Fair Street	Kingston
Delaware Construction Company	Sidney
DeMichael, John	Torrington, Conn.
Dickinson, Guy B., Kirk Building,	Syracuse
DiMartino & Musse, R. F. D. No. 1	Craryville, Pa.
Dolan, John F., 50 Church Street	New York
Dollard, M. F.	Albany
Dollard & Heeran, 118 Van Wert Street	Albany
Donovan, John F.	Saugerties
Dorpian City Construction Company, 313 Congress Street	Schenectady
Dower, John B.	Ballston
Doyle & Company, E. J., 83 State Street	Albany
Dunbar Construction Company, 440 N. 68th Street	New York City
Dunkirk Construction Company, 114 Eagle Street	Dunkirk
Edgecomb Brothers	Binghamton
Ellis, Fred B.	Melrose, Mass.
Elmere & Hamilton Construction Company, McDonald Bldg.	Schenectady
Erie Construction Company, D. S. Morgan Building	Buffalo
Falk & Menzien, 6 S. Division Street	Buffalo
Falls Brothers & Fletcher, 338 State Street	Rochester
Fitzgerald, Thos.	Fredonia
Fitzwater & Terry	Waterville
Flood & VanWirt	Hudson Falls
Flynn, John W.	Waterford,
Foote, Frank	Nunda
Fowler, F. G., Construction Company	Mt. Kisco
Fox, W. G.	Saratoga Springs
Fredrich, J., Company, 16 State Street	Rochester
Gaffey, Albert, 260 Jamaica Avenue	Syracuse
Garfano, James, South Third Avenue	Mt. Vernon
General Construction Company, 1913 E. Main Street	Bridgeport
Gill, T. H., Winter Hill Station	Boston, Mass.
Gipp, Louis H., Company, 94 Claremont Avenue	Buffalo
Gordon, John H.	Albany
Grady, Thos., & Company, Butler Building	Rochester
Greece Construction Company, 718 Chamber Commerce Building,	Rochester
Greenfield Construction Company, 86 Main Street	Hornell
Hagaman & White, 16 State Street	Rochester
Hagaman, Miller & Hagaman, 688 Clinton Avenue	Rochester
Hailes, Theodore C., Jr., 86 State Street	Albany
Hallock & Angle	Newburgh
Hamilton, F. W., 238 Spencer Street	Rochester
Harper, Jova & Kehos, 62 Second Street	Newburgh
Harradine Brothers	Spencerport
Harrigan, John, Pauli Building	Scranton, Pa.
Hazzard, William	Trumansburgh
Hendrickson, McCabe Construction Company	Spencerport
Henson, Robert W., Pullney Street	Geneva
Herlihy Construction Company, 16 Bridge Street	Glens Falls

Herring, H. G., Jr., & Company	Hillsdale, N. J.
Hillson Brothers	Kinderhook
Holington Company, The	Troy
Hopkins, Richard, 824 Second Avenue	Troy
Hucknall Construction Company	Albion
Hull, Seneca P.	Cortland
Hurley & Lyne, 86 Temple Street	Fredonia
Huston, T. L.	New York City
Hyde, John, R. F. D. No. 1	Rome
International Fidelity & Insurance Company	Jersey City, N. J.
Java & Kehoe	Newburn
Johnson, John E., & Company	Buffalo
Johnston, James W., 5014 Bleecker Street	Utica
Jordan, C. F., & Company, 40 State Street	Albany
Kantrowitz, Morris	Albany
Karr, Thos. H., 714 Fulton Street	Troy
Kelly, John	Syracuse
Kennedy Construction Company, 534 Broadway	Albany
Knapp, R. W.	Mooers
Kerwin Construction Company, 27 Howard Street	Albany
Klock & Company, M. R., 135 Flower Avenue	Watertown
Lake Shore Construction Company	Dunkirk
Landel, John W.	Tonawanda
Lane Construction Company	Meriden, Conn.
Lang & Horton	Schuylerville
Lawlor Brothers Construction Company, 13 Park Row	New York City
Love, E. & M., & Son, Park Street	Corry, Pa.
McCabe, William F. Construction Company	White Plains
McComb, Chas. O., R. F. D. No. 1	Ithaca
McCormick, Joseph, 315 Taunton Avenue	East Providence, R. I.
McDonald, W. P., Construction Company	Mt. Vernon
McGreevey, McGuigan Company	Elmira
McGuire & Fahy	Hornell
McIntyre, Wm., & Company	Sharon, Pa.
McLoughlin & Burchill, 322 Bastable Building	Syracuse
McMahon & Fell, 1041 Cleveland Avenue	Niagara Falls
McNamara, James, 425 Robin Street	Dunkirk
McNames, Henry	Eddyville, Ulster County
McNerny Contracting Company	Canton, Pa.
Macafee Concrete Company	Athens, Pa.
Mahoney, Thomas, 51 Falkner Street	Jamestown
Mahoney & Swanson, 225 Fortcoyne Street	Jamestown
Malloy, J. J., 1404 Albany Street	Schenectady
Martin, James E.	Poughkeepsie
Meehan, Thos., & Sons, 7106 Germantown Avenue	Philadelphia, Pa.
Meekes, F. P.	Long Road, Pa.
Melius, L. L., 2306 8th Avenue	New York City
Merritt Construction Company	Tuckahoe
Miller, Burr C., 62 S. Franklin Street	Wilkesbarre, Pa.
Miller & Knickenberg, 702 Michigan Street	Buffalo
Mitchell Wilson Company	Niagara Falls
Monroe Roads Company	Pittsford
Mosier & Summers, 1266 Seneca Street	Buffalo
Mott, Daniel L.	Utica
Moynahan, J. D., Company	Mohawk
Mulderry Brothers	Albany
Mulderry, Patrick W., 5 St. Joseph's Terrace	Albany

Mullen, Henry J., 289 Fulton Street	Jamaica
Mumm, Fred J., 176 Best Street	Buffalo
Murphy, John A. & B. Thos	Cobleskill
Murray Construction Company, Martin, 14th & Fulton Streets	Troy
Murray, Patrick M., Cutler Building	Rochester
Murray, Thos. F	Le Roy
Musso, Alfred	Frankford
Navagh, Tom	Saratoga Springs
Nelson, John H., & Company	Herkimer
Newman, Henry, 215 Montague Street	Brooklyn
Newport Construction Company	Herkimer
Niagara Construction Company, 263 Richmond Avenue	Buffalo
Northwestern Construction Company, Box 33	Franklin, Pa.
O'Hern, Thos	Yonkers
Orange County Road Construction Company	Central Valley
Paddock & Williams	Oneida
Paddleford & King	Sherburne
Palmer, J. K., & Company	Clearfield, Pa.
Patterson, William, 398 Broadway,	Albany
Pierce, B. D., Jr., 122 Bank Street	Bridgeport, Conn.
Public Service Construction Company	Buffalo
Reardon, C. J., 114 Warren Street	Glens Falls
Rhody & Clawson	Albion
Rhodey & Tyler	Albion
Ring Construction Company, W. H., 28 Paterson Street	Paterson, N. J.
Roberts, Harry W., 13 Broad Street	Utica
Rockwood, A. J	Belgium
Ruddy & Saunders Company	Troy
Russo, Parkes, 119 S. Warren Street	Hudson
Ryan & Yale	Brewsters
Santanoni Construction Company	Newcomb
Saptienza, James V., 19 Georgia Street	Buffalo
Schaupp, Alonzo	Albany
Schroeder Hicks Construction Company, 416 Mercantile Block	Rochester
Schroeder, Henry C., 419 German Insurance Building	Rochester
Schunnemunk Construction Company	Highland Mills
Semper Brothers	Watertown
Service & Mackey	Youngstown
Sharra-Reynell Construction Company, 442 Hancock St	Long Island City
Shaughnessey, T. T., & Company, 372 Broadway	Albany
Sherrill Hardware & P. Company	Hudson Falls
Shutt, Albert M	Sidney
Slatcher, Alfred G., 165 Seventh Avenue	Troy
Smith, Robert W., 136 Liberty Street	New York City
Snead & Wilson	Brown Station
Snell, D. I., & Company	Canajoharie
Spellman, Oliver, Company	Mooers
Sproul, Harvey B., Inc., 1010 Main Street	Peekskill
Sproul & Elsen	Peekskill
Spuyten Duyvil Const. Company, 271 W. 125th Street	New York City
State Highway Construction Company, 50 State Street	Albany
Stewart, James, & Company, 30 Church Street	New York City
St. Lawrence Construction Company	Menands
St. Regis Construction Company	Albany
Suffock Construction Company	Huntington
Sullivan, John D	Keeseville
Swank & McIntyre, 263 Richmond Street	Buffalo

Taylor & Ousterhoudt	Olean
Trey & Mack, 239 N. Union Street	Olean
Trombly & Eldert, 36 N. Washington Street	Jamaica
Union Paving Company	Schenectady
Van Wagonon, S. B.	Rondout
Waldon & Mead	Plattsburg
Walker, Jospeh, 44 State Street	Albany
Walsh, Edward, 137 Ferry Street	Troy
Walsh, James E.	Mechanicville
Warren Brothers, Company, 59 Temple Place	Boston, Mass.
Weidman, John H., 304 Kirk Building	Syracuse
Wells, Boughton & Company	Troy
White & Colligan	Purchase
Whitmore, Rauber & Vicinnes, 279 South Avenue	Rochester
Wiltsie & Rigney	Rensselaer
Winston Company	Brown Station
Wood & Tompkins	Hilton
Young, Andrus D., 121 Putnam Avenue	Brooklyn
Young, Nathan B.	Windsor

Road, Street and Bridge Contractors

Bonn, Samuel	Syracuse
Brennan, J. W.	Geneva
Buffalo Structural Steel Company	Buffalo
Burke, Joseph F.	Plainfield
Calahone, Jas. P.	Jamestown
Cement Company	Buffalo
Ciarcia, Jas.	Mt. Vernon
Cleveland, L. B.	Watertown
Coddington, S. Read, Engineering Contractor	Niagara Falls
Dumay, T. H.	Albany
Eastern Asphalt Company	Mt. Vernon
Elbech, E. L.	White Plains
Field, Wm. T.	Watertown
German Rock Asphalt	Buffalo
Gipp, L. H.	Buffalo
Gridley, R.	Schenectady
Hallinan Brothers	Little Falls
Harlem Contracting Company	New York City
Hodge, C. D., & Company	Watertown
Holler, J. M.	Albany
Hookway, C. T.	Syracuse
Jackmann, Edw.	White Plains
Jamestown Construction Company	Jamestown
Kalteaux, Frank Company	Schenectady
Klock, M. R., & Company	Watertown
Lyne, John J.	Binghamton
Merone & Cortesi	Mt. Vernon
Miller Brothers	Schenectady
Mohres Brothers	Plainfield
Morano, Ben	White Plains
Mulderry, B. F.	Albany
Norclone, Frank	Mt. Vernon
O'Brien, Thos.	Watertown
Osborne, A. D.	Binghamton
Peters, N. D., & Company	Utica
Petrillo Brothers	Mt. Vernon

Piro, James	Mt. Vernon
Richards, David	White Plains
Richards, Tony	White Plains
Schenectady Contracting Company	Schenectady
Semper, W. J.	Watertown
Seymour, A. A.	Little Falls
Snell, L. J.	Little Falls
Stabbell, J. F., & Company	Buffalo
Stephens, G. C.	Albany
Syracuse Bridge Company	Syracuse
Turname, Joseph	White Plains
Walker, H. W.	Jamestown
Warner, Quinlan Asphalt Company	Syracuse
Willey, A. L.	Binghamton
Union Paving Company	Schenectady
United Construction Company	Albany
United States Wood Preserving Company	Mt. Vernon

North Carolina

Road Contractors

Brett Engineering & Contracting Company	Wilson
Drane, B. S.	Charlotte
Lassiter, R. G.	Oxford
Myers, E. W.	Greensboro
Tompkins, D. A., Company	Charlotte
White, G. C.	Durham

North Dakota

Bridge Contractors

Fargo Bridge & Iron Company	Fargo

Road, and Street Contractors

Bird, Q., & Sons	Fargo
Bitulithic & Contracting	Winnipeg, Mont.
Fielding & Shepley,	Minneapolis, Minn.
Grand Fork Concrete Company	Grand Fork
Jardine & Anderson	Fargo
Kennedy, James	Fargo
McDonnell, P.	Duluth, Minn.
Northern Contracting & Engineering Company	Grand Fork
Turner, A.	Grand Fork

Ohio

Road, Street and Bridge Contractors

Akron, Storage & Contracting Company	Akron
Arpp, Jno.	Middleton
Beasley, Jno. C.	Columbus
Bentz Brothers	Columbus
Biery, Chas.	Alliance
Bigler Brothers	Middleton
Boun, Wm., & Company	Lima
Brady, A. J.	Marion

Bird, L. D.	Canton
Campbell, Press	Canton
Carroll & Gruber	Marion
Childers, C. A.	Alliance
Clifford, W. F.	Ashtabula
Dennis, George	Warren
Department of Public Service	Massillon
Devince, J. C., Company, The	Alliance
Dieffenbacker & Sons	Massillon
Drake, J. C.	Marion
Drake, P., & Sons	Marion
East Iron & Machine Company	Lima
Enck, H. S.	Lima
Fetter, J. K., & Son	Lima
Fitzgerald, T. P.	Ashtabula
Fleming & Platt	Youngstown
Freshwater Brothers Company	Chester, W. Va.
Geigele Garnes & Company	Columbus
Geiger, Fred L.	Warren
Gillespie, Joe	Marion
Graham, Wm. M.	Columbus
Harris, Charles	Youngstown
Hinton, Cunningham	East Liverpool
Hofsletter & Dawson	Marion
Hynes, Wm.	Youngstown
Jameson, W. F.	Lima
Kennedy Brothers	Youngstown
Kesting, Fred	Middletown
Knight, S. T.	Columbus
Kunkle, Wm. J.	Ashtabula
Lane, Geo. W.	Newark
Lima Stone Company	Lima
McCarron, James	Youngstown
McCourt, Matthew	Akron
McCracken, Jas.	Warren
McGowan, Jas. J.	Akron
McLaughlin & Allison	East Liverpool
McShaffrey, E. M., & Son	Akron
Maple-Mullen Construction Company	Lima
Massillon Bridge & Structural Company	Massillon
Meinhart, Jos., & Son	Massillon
Midland Construction Company	Lima
Nutter & Company	Newark
O'Marr, Daniel	Akron
O'Toole, M. H.	Akron
Patterson, B. F.	Columbus
Patterson, Geo. B.	Liverpool
Portage Engineering Company	Akron
Pugh, A. G.	Columbus
Ready, A. H.	Warren
Rinehart Brothers Company	Liverpool
Ryan, J. M., & Son	East Liverpool
Schirsler, Peter	Canton
Scott, J. W., & Company	Canton
Serafino, Andrew	Youngstown
Shook, Ray	Youngstown

Sheeles, Jno	Canton
Smith, Wm. T	Warren
Summers & Hardin	Lima
Turnball & Brothers	Canton
Turner & Olson	Youngstown
Urban & Clements	Massillon
Vogt, W. H., & Sons	Massillon
Walters & Russell	Akron
Wendling, A. F	Massillon
Wildes & Davidson	Akron
Wilson Contracting Company	Newark
Wilson, Jno	Alliance
Youngstown Construction Company	Youngstown

Oklahoma

Road, Street and Bridge Contractors

Eureka Construction Company	Tulsa
Fife, E. G	Tulsa
Lemtry, J. T	Tulsa
New State Paving Company	Tulsa
Pease, W. S	Tulsa
Sturgis, N. H	Guthrie
Washington, Parker, Company	Tulsa
White, M	Guthrie

Oregon

Road, Street and Bridge Contractors

Arenz & Son	Salem
Henry, Clark Company	Eugene
Keheberger, A	Salem
O'Reilly, M	Portland
Pugh, W. D	Salem
Warren Contracting Company	Portland

Pennsylvania

Road Contractors

Ambler Davis Company, 1016 Harrison Building	Philadelphia
American Asphaltum & Rubber Company, 600 Harvester Bldg	Chicago, Ill.
Amies Road Company, 582 Bourse	Philadelphia
Archer, E. A., Rothchild Building	Philadelphia
Atlanta Construction Company	Kanona, N. Y.
Barber Asphalt Company, The	Philadelphia
Bennett, M., & Sons	Indiana
Bennett, Thos. J., 322 N. Main Street	Greensburg
Bird, H. M., Union Trust Building	Harrisburg
Birdsboro Stone Company, 614 Bulletin Building	Philadelphia
Bloome, Rudolph S., & Company, 79 Dearborn Street	Chicago, Ill.
Borneman & Company, F. A	Lansdowne
Bornemann & Beitler Cons. Co., 1208 West End Trust Bldg	Philadelphia
Boyd, J. C	Lebanon
Bushkill Quarry & Construction Company, Lehicton Street	Easton

Byerley & Sons, 830 Land Title Building	Philadelphia
Carothers Contracting Company	Altoona
Carson, D. J.	DuBois
Church Engineering Company, 603 Real Estate Trust Bldg.	Philadelphia
Clarke, John T., 37 Wall Street	New York, N. Y.
Cohen, Frank L., 49 Magara Street	Buffalo, N. Y.
Construction Service Company, 15 William Street	New York, N. Y.
Coryell Construction Company	Williamsport
Eastburn, Chas. T.	Yardley
Eastern Paving Company, 55 Baxter Building	Philadelphia
Evers, Owen J., 613 Arcade Building	Philadelphia
Filbert Paving & Construction Company, 903 Penna. Bldg.	Philadelphia
Fisher, Henry, 26 Broadway	New York, N. Y.
Fiss & Hartman	Shamokin Dam
Foley Brothers, 7th Avenue Hotel	Pittsburgh
Francis, J. E.	Punxsutawney
French, Walter S., & Company	Moorestown, N. J.
Gaynor Contracting Company	Scranton
General Fireproofing Company, The	Youngstown, Ohio
George, Frank, 715 Frick Building	Pittsburgh
Gill, T. H., Company	Whitney Point, N. Y.
Goebal, H. W., & Company, 1524 Weightman Building	Philadelphia
Gonder, B. B	Strasburg
Good, E. M.	Havre de Grace, Md.
Greaney, F. H., 79 Milk Street, P. O. Square Building	Boston, Mass.
Gulf Refining Company, 913-917 Harrison Building	Philadelphia
Heavey, Charles D., 114 N. 13th Street	Philadelphia
Hengst, R. G.	New Castle
Herron, M. O., & Company, 10th and McKean Streets	Pittsburgh
Hinkle, Inc., H. G., Central Trust Company	Altoona
Hoenisch, A. H., 111 E. Mt. Airy Avenue	Philadelphia
Howley Construction Company	Pittsburgh
Howley, W. E., & Company, Frick Building	Pittsburgh
Hunter-Hines Company	Washington
Jersey Paving Corporation	Newark, N. J.
Juniata Paving Company, The, Empire Building	Philadelphia
Kelley-McFeeley Company, Third and Market Streets	Camden, N. J.
Latham, Fayette M., 213 E. North Avenue	Baltimore, Md.
Love, E. M., & Son	Corry
Lyons, W. H.	Sunbury
McGovern Construction Company	Punxsutawney
McLaughlin Contracting Company, 1404 McChesney Building	Pittsburgh
McMenamin Philips Company, 609 Harrison Building	Philadelphia
McMenamy, John, 319 E. Lehigh Avenue	Philadelphia
McNeil, Donald, 6124 Jenkins Arcade	Pittsburgh
MacWilliams & Company, 200-203 Trustee Building	Harrisburg
Martin, W. F., Box 200	Harrisburg
Means, G. W	Punxsutawney
Meehan, Thos., & Sons, Mt. Airy	Philadelphia
Miller, L. E., P. O. Box 165	Philadelphia
Miller, J. H., 43½ Washington Avenue	Altoona
Monroe Paving Company	Langhorne
Myers, Benjamin D., 403 Bessemer Building	Pittsburgh
Neff & Horn	Slatington
Nelson & Merydith Company	Chambersburg
Northwestern Construction Company, The	Franklin
Payne, Olney R., Machine & Structural Works	Lancaster

Pearson, S., & Sons, Inc., 507 Fifth Avenue	New York, N. Y.
Post, Edward H., 53 Bennett Building	Wilkes-Barre
Putnam, H. O	Oil City
Quinn, M. P., 612 Fidelity Building	Philadelphia
Reilly, T. F., 50th and City Avenue	Philadelphia
Rinehart Brothers	East Liverpool, Ohio
Robinson, I. G	Hollidaysburg
Rogers, D. J., 718 Front Street	Danville
Simpson, C. R., 220 Broadway	New York, N. Y.
Spencer, Herbert, 26 Broadway	New York, N. Y.
Standard Oil Company, 26 Broadway	New York, N. Y.
Standard Asphalt & Rubber Company, 137 S. LaSalle Street	Chicago, Ill.
Standard Bitulithic Company, 50 Church Street,	New York, N. Y.
Studebaker Corporation, The, 14 S. Broad Street	Philadelphia
Sun Company, Morris Building	Philadelphia
Suppes, C. H., Jr., Suppes Building	Johnstown
Susquehanna Stone Company	Williamsport
Taylor, R. B	Bellefonte
Texas Company, 622 Arcade Building	Philadelphia
United Paving Company, 533-540 Bartlett Building	Atlantic City, N. J.
Vipond Construction Company	Altoona
Wadsworth Stone & Paving Company, Lambert Street & P. R. R.	Pittsburgh
Walk, I. C	Quincy
Walker, Joseph, Room 6, 44 State Street	Albany
Whalen, E	Towanda
Wilson-Lacy-Hursh Company, 25 N. 7th Street	Philadelphia
Wyoming Valley Construction Company	West Nanticoke

Road, Street and Bridge Contractors

American Paving & Construction Company	Philadelphia
Applegate, M. & Son	Bradford
Bader & Huebner	Johnstown
Barr, Peter	Shamokin
Beck, E. T	Warren
Best, Jno., & Son	Johnstown
Boyer, Norman J	Butler
Brooks, H. C., Company	Clarksburg, W. Va.
Burns Brothers	New Castle
Clark, Geo. W	Johnstown
Coates, A. L	Warren
Cunningham Paving & Contracting Company	Philadelphia
Davis Lumber Company	Shamokin
Diefendorf, F. G	Erie
Dobling, Jno	York
Doyle, J. & M	Erie
East End Lumber Company	Shamokin
Evans & Boyer	Norristown
Fritchey, J. N., & Son	Lancaster
Funkhouser, A. L	Beaver Falls
General Supply & Construction Company	York
Harris, Geo. M	Meadville
Hartley-Ziegler Company	York
Hatten & Company	DuBois
Headley Good Roads Company	Philadelphia
Hinden, F. X	Lancaster
Hochstein, Jno. F	Johnstown

James & Felton	Johnstown
Johnson & Kearns	DuBois
Kendig, J. B.	Lancaster
Kraft, A. B.	York
Kumer & Jones	Shamokin
Lavery, Wm.	Warren
McCain & Strayer	Erie
McClintick-Marshall Company	Pottstown
McCormick, John, & Son	Erie
McDonald Construction Company	Scranton
McFall, George S.	Beaver Falls
McFarland, Morris	Polktown
McGuerney, Frank	Easton
McGuigan, Thos.	Meadville
McGuire, J. G. & Company	New Brighton
McHough, M. & J. B.	Philadelphia
McNamee, H. A.	Butler
McQuistion, Earl	Butler
Mack Paving Company	Philadelphia
Maloney, Jno.	Jamestown, N. Y.
Mayer Brothers Contracting Company	Erie
Miles-Tighs Contracting Company	Easton
Miller, M. E.	New Castle
Minns Brothers	DuBois
Moores, Harry	Norristown
Morello, Tony	Butler
Morrison, W. S.	New Brighton
Mullineaux, J. Edward	Easton
Myers & McWilliams	Lancaster
New Castle Contracting Company	New Castle
Otto Contracting Company	Lancaster
Owego Bridge Company	Philadelphia
Porter, D. R.	Beaver Falls
Rhodes Brothers	Chambersburg
Rizzuti & Chiodo	Bradford
Rote, A. B., & Company	Lancaster
Ruthven, R. C.	Scranton
Schaffner, John	Butler
Shamokin Lumber Company	Shamokin
Shanley, J. F., & Company	Philadelphia
Sheehan, Jno.	Bradford
Shoemaker & Company	Pottstown
Skinner, M. O.	DuBois
Smith, Jas. M.	Green Lane
Smith, T. V.	Norristown
Thiele Construction Company	Johnstown
Union Paving Company	Philadelphia
Vetter Construction Company	Meadville
Waller, George	New Castle
Willamer & Company	Pottstown
Woods & Golden	New Castle
York Bridge Company	Scranton
York Bridge Company	York

Rhode Island

Road Contractors

Callan, Luke H.	Bristol
Couture, Adelard	Arctic
Hathaway & Cotton	Tiverton
McCormick, Joseph	East Providence
Peckman Brothers	Newport
Quinn, Thomas J.	Ashton
Westerly Concrete Company	Waverly

Bridge Contractors

Austin & Company, George F., Wood Street	Providence
Beattie & Wilcox	Fall River, Mass.
Bristow Brothers & Knowles Corporation	Narragansett Pier
Cullman, Thos. F., Company	Providence
McKinnon Brothers	Providence
Shaw, Frederick E.	Providence

South Carolina

Road, Street and Bridge Contractors

Atlantic Bitulithic Company	Richmond
Cain, Jno.	Columbia
Legore, A. E., Construction Company	Columbia
Waring, Geo.	Columbia
West Construction Company	Chattanooga, Tenn.
Western & Brooner	Columbia

South Dakota

Road Contractors

Airey, R. B.	Pierre
Atkinson, C. H.	Watertown
Fanehust Construction Company	Sioux Falls
Huston, R. J.	Sioux Falls
Ledyard, L.	Sioux Falls
Sampson, Jos.	Sioux Falls
Stolte & Miencier	Redfield

Tennessee

Road Contractors

Baird & Baird	Morristown
Bracey, F. E., & Company	Algood
Brady Construction Company	Knoxville
Condon, Stev.	Knoxville
Cresap, J. L., & Company	Humboldt
Cross, E. C., Construction Company	Trenton
Denton, J. C., & Brothers	Ettowah
Doggett & Dowdy	Knoxville
Foster, Creighton & Gould	Nashville
Freeman & Robbins	Knoxville
French Brothers Construction Company	Knoxville
Gallahan Construction Company	Knoxville
Kreis-French Construction Company	Knoxville

McCrary Construction Company	Knoxville
McTye, J. B.	Knoxville
Mann, Horace	Knoxville
Monday, Monroe	Knoxville
O'Connor, John	Knoxville
Patton & Bean	Rogersville
Peebles, W. H.	Nashville
Peters, R. L.	Knoxville
Peters & Gibson	Knoxville
Smalling & Gray	Bristol
Stokes Construction Company	Jefferson City
Stone Construction Company	Nashville
Tennessee Metal Culvert Company	Nashville
Williams, Boyd	McMinnville

Bridge Contractors

Nashville Bridge Company	Nashville

Texas

Road and Street Contractors

Creosoted Wood Block	New Orleans, La.
Moon, M. A.	San Angelo
Municipal Paving Company	Dallas
Murphy-Moulton Company	Denison
United Contracting Company	Denison
Walde Rock Asphalt Company	Beaumont

Utah

Bridge Constructors

Clark, A. A., Company	Salt Lake City
Idle, M. E., Continental National Bank Bldg.	Salt Lake City
Minneapolis Steel & Bridge Co., Felt Bldg.	Salt Lake City
Midland Steel & Bridge Co., Newhouse Bldg.	Salt Lake City
American Bridge Company of N. Y., Walker Bank Bldg.	Salt Lake City

Road Contractors

Moran, P. J.	Salt Lake City
Strange-Maguire Company	Salt Lake City
Burke, J. J., Kearns Bldg.	Salt Lake City

Virginia

Road Contractors

Adams, W. D., Jr.	Lynchburg
Alsop & Pierce	Norfolk
Bennett, J. T.	Danville
Bennington, S. B., 912 Cabell Street	Lynchburg
Birch, J. E., R. F. D. 1	Balston
Boxley Brothers	Roanoke
Bradley, Jas. F., & Company	Richmond
Bruce, R. S.	Lexington
Bunn & Company	Big Stone Gap
Chandler, T. W., & Company	Virgilina
Clark, Porter A.	New Castle

Clay & Steel	Richmond
Colbert, L. R.	Massaponax
Dalby, Nottingham & Company, Box 180	Portsmouth
Denby, R. P.	Norfolk
Duncan, James	Alexandria
Ford, J. R., 1609 Fillmore Street	Lynchburg
Fowlkes, J. E.	Chula
Gaither Construction Company	Manassas
Gills, John W.	Lynchburg
Guild & Company, Box 193	Norfolk
Hankins, L.	Richmond
Harman, L.	Christiansburg
Henkle, J. M.	Buena Vista
Hurt, J. H. & W. W.	Wytheville
Johnson, L. M.	Arlington
Lane Brothers Company	Altavista
Lassiter, R. G.	Virgilina
Lawson, J. S.	Wytheville
Layman Brothers & Company	New Castle
Lindsay, E. P.	Portsmouth
Long, John C.	James River
Luck Construction Company	Roanoke
McKinney & Slocombe	Lynchburg
McMahon, J. T., 302 Board of Trade Building	Norfolk
McGuire, F. J.	Norfolk
Matthews-Curtis Company	Clifton Forge
Meem, J. L., Engineering Company	Lynchburg
Mundy Brothers	Amherst
Morriss, M. B.	Richmond
Nance, W. A.	Bedford
Pendleton & Rule Construction Company	Wytheville
Pettitt, James	Arlington
Pierce, R. M., Lynch Building	Lynchburg
Rogers, Dr. C. E.	Covington
Rust, Robert N., R. F. D. No. 2	Alexandria
Sanders & Fry	Seven Mile Ford
Southern States Engineering & Equipping Company	Norfolk
Smith & Lowe	Pulaski
Smith, I. J., & Company	Richmond
Specialty Construction Company, Box 728	Norfolk
Taylor, Guy	Clintwood
Tidewater Construction Company, 2124 Chaffin Street	Richmond
Trice, G. E., & Company	Hampton
Valz, A. M.	Staunton
Vaughan Construction Company	Roanoke
Veitch, W. P., 214 S. 6th Street	Richmond
Walton & Company	Falls Mills
Warden, Hottel & Company	Pulaski
Water Works Supply Corporation	Norfolk
Weaver, W. D., R.F.D. No. 1	Harrisonburg
Wiles, H. O.	Bluefield, W. Va.
Williams, C. R.	St. Paul
Wingate & McGhee	Roanoke
Wise, W. H.	Arlington
Wrenn, James F., 436 Hamilton Avenue	Norfolk
Wood, J. R.	Lynchburg
Yoder, H. W.	New Castle

Bridge Contractors

Johns, V. M., 947 North Street	Portsmouth
Pittsburg Steel Products Company	Norfolk
Roanoke Bridge Company	Roanoke
Virginia Bridge & Iron Company	Roanoke

Washington

Road Contractors

Allred & James	Rochester
Anderson, J. S.	Chehalis
Aumiller, G. T.	North Yakima
Ball, D. A.	North Yakima
Barber Asphalt Paving Company	Seattle
Bell-Scott Company	Seattle
Buchanan, Jas. H.	Port Stanley
Bulette, W. O.	Port Orchard
Butler Construction Company	Seattle
Cascade Trading & Construction Company	Bellingham
Central States Bridge Company	Spokane
Chase, H.	Seattle
Clarkson, J. H.	North Yakima
Columbia Engineering & Construction Company	Wenatchee
Construction, G. & M., Company	Hoquiam
Costello & Company, John F.	Spokane
Coyne, P. M. & J. H.	Port Townsend
Creelman, C. L.	Tacoma
Davis, B. S.	Chehalis
Ffolliette, F. Kerr	Everett
Frazier, F. W.	Seattle
Gerrick & Gerrick Company	Seattle
Govan, David & Gritchfield, U. G.	Port Angeles
Graff Construction Company	Seattle
Guernsey, W. F.	Vancouver
Hardy, R. M.	North Yakima
Hapgood, Frank	Stevenson
Hawkins, J. A.	Dayton
Heinemann, M. C.	Seattle
Hendrick & Shumway	Omak
Hill, J. F.	Spokane
Hoffman, John	Walla Walla
Inland Empire Hassam Paving Company	Spokane
International Contract Company	Seattle
Jahn Contracting Company	Seattle
Johnson, Edward	Bridgeport
Jordan, H. S.	Seattle
Keasel Construction Company	Tacoma
Kendle & Moulton	Tacoma
Lance & Peters	Seattle
Lanning, L.	Walla Walla
Lizee, Arthur	North Yakima
Lyon & Irwin	Hoquiam
McEachern Company, The, J. A.	Seattle
McGuire & Rauch	Anacortes
Mahaney, I. T.	Bridgeport
Martell, Wm.	Seattle

Mills Brothers	Olympia
Moore, J. M.	Quincy
Naylor & Norlin Company	Spokane
Nelson, Roy	Prosser
O'Hogge & Empey	Spokane
Omaha Structural Steel Works	Tacoma
Pearson Construction Company	Seattle
Pierce, Frank	North Yakima
Puget Sound Bridge & Dredging Company	Seattle
Quigg, J. W.	Wenatchee
Rex, W. G., Kent, A. C. & Leisure, E. C.	Shelton
Ryan, T.	Seattle
Rydstrom, Arvid	Tacoma
Sloane Brothers	Seattle
Smith Construction Company	Okanogan
Spokane Asphalt Macadam Paving Company	Spokane
Spokane Paving & Construction Company	Spokane
Stevens County Construction Company	Colville
Stratton & Smith	Spokane
Sunset Construction Company	Tacoma
Taylor-McKittrick Company	Vancouver
Washington Engineering Company	Tacoma
Washington Paving Company	Tacoma
West Coast Construction Company	Everett
Wilson-Bailey Construction Company	Walla Walla
Wood, J. R.	Seattle
Woods, P. J.	Port Angeles
Zindorf, M. P.	Seattle

Road, Street and Bridge Contractors

Cunningham, J. E.	Spokane
Hurley-Mason Company	Tacoma
Independent Asphalt Paving Company	Seattle
Jones, N. A.	Tacoma
Keefe, Dion	Walla Walla
McHugh, P. J.	Seattle
Mitchell Brothers	Spokane
Mitchell, J. B.	Spokane
Murphy, Wm. J.	Tacoma
Nelson & Carlson	Seattle
Payne, C. M.	Spokane
Peterson, Andrew, & Company	Seattle
Sparger Contracting Company	Seattle
Tribon & Blackman	Walla Walla
Water, Jno.	Tacoma

West Virginia

Road and Street Contractors

Brooks, H. C.	Martinsburg
Ellis, S. A., & Brother	Martinsburg
Heydenreich, L.	Parkersburg
Kennedy, C.	Parkersburg
Lehman, Otto	Parkersburg
Nelson-Merydith Company	Parkersburg
Skidmore, C.	Parkersburg

Wisconsin

Road and Street Contractors

Bartz, F.	Appleton
Campbell & Morgan	Appleton
Cape, Jas., & Son	Racine
Hackworthy Construction Company	Appleton
Johnson, Chris	Oshkosh
Jones, Jno. O.	Racine
Knupple, Aug.	Appleton
Larsen, L. A.	Oshkosh
McCugo-Bulloch Company	Waukegan, Ill.
O'Keefe, & Orbisen	Appleton
Pedersen, Christ.	Kenosha
Rasmussen, J. R., & Sons	Oshkosh
Reichurt, N. F.	Racine
Stanchfield, Geo. H.	Fond du Lac
Vulcan Manufacturing Company	Fond du Lac
White Construction Company	Milwaukee

AMERICAN HIGHWAY ASSOCIATION

The American Highway Association was organized at Washington, D. C., November 22, 1910.

Its purposes are:

To correlate and harmonize the efforts of all existing organizations working for road improvement.

To arouse and stimulate sentiment for road improvement.

To strive for wise, equitable and uniform road legislation in every State.

To aid in bringing about efficient road administration in the States and their subdivisions, involving the introduction of skilled supervision and the elimination of politics from the management of the public roads.

To seek continuous and systematic maintenance of all roads, the classification of all roads according to traffic requirements, payment of road taxes in cash, and adoption of the principle of State aid and State supervision.

To advocate the correlation of all road construction so that the important roads of each county shall connect with those of the adjoining counties and the important roads of each State shall connect with those of adjoining States.

To strive for the utilization of convict labor on works of public improvement, where that course is consistent with the local policy, so as to involve the least possible competition with free labor, the utmost public benefit, and a healthy moral and physical development of the convict. In many States these results can be attained by using the convicts on road work or the preparation of road materials.

Constitution

Article I

(as amended)

Name

Section 1. The name of this organization shall be The American Highway Association.

ARTICLE II

Object

SECTION 1. The object of this Association is to harmonize and correlate all efforts for the improvement of the public roads, to the end that adequate and efficient systems of road construction, administration, and maintenance may be adopted in all of the States.

ARTICLE III

Location

SECTION 1. The official headquarters of this Association shall be located and maintained in the city of Washington, D. C.

ARTICLE IV

Membership

SECTION 1. The regular membership of this Association shall be composed of all persons who shall sign the roll of membership at the time of organization, or make written application to the Secretary and pay annual dues for one year in advance, membership to begin with written acceptance by the Secretary.

SEC. 2. The associate membership shall consist of all members of State and other organizations for road improvement, coöperating with this Association, *provided*, that a roster of such membership shall be filed with the Secretary by said organization.

SEC. 3. The sustaining membership shall consist of all persons or organizations who shall sign the roll of sustaining membership at the organization of this Association, or make written application to the Secretary and pay annual dues for sustaining membership one year in advance, membership to begin as soon as written acceptance shall have been received from the Secretary.

ARTICLE V

Officers

SECTION 1. The officers of this Association shall consist of a President, a Vice-President, a Treasurer, a Secretary, an Organizer, and a Board of Directors, to consist of the President and Vice-President of the Association and 23 additional members.

SEC. 2. The officers of the Association and the members of the Board of Directors shall be regular or sustaining members of the Association, and shall be elected at the first regular meeting and annually thereafter, except that the members of the Board, exclusive of the officers, shall be elected in three groups, the first to hold office for a period of three years, the second to hold office for a period of two years, and the third to hold office for a period of one year, vacancies on the Board to be filled annually thereafter.

ARTICLE VI

Committees

SECTION 1. There shall be four standing committees of this Association: An Executive Committee, consisting of five members; a Finance Committee; a Committee on Membership, and an Auditing Committee, consisting of three members. The members of the Auditing Committee shall be selected by the President at the first annual meeting, and shall hold office until the next regular meeting of the Association. The members of the other three committees shall be selected by the Board of Directors, and shall hold office until the next regular meeting of the Association.

ARTICLE VII

Amendments

SECTION 1. This Constitution may be amended at any regular meeting of the Association by three-fourths of the qualified voters present, *provided*, that the Secretary shall notify members of the Association of said regular meeting.

ARTICLE VIII

By-Laws

SECTION 1. The Board of Directors shall make such By-Laws for the government of the Association as it may deem necessary, and which shall not conflict with the provisions of the Constitution, and may amend or alter the same.

By-Laws

ARTICLE I

Annual Dues

SECTION 1. The annual dues for regular members of the Association shall be $5, payable in advance. Annual dues for sustaining members shall be $100, payable in advance. Associate members shall not be required to pay annual dues to this Association.

ARTICLE II

Voting Privileges

SECTION 1. Regular members of the Association shall be entitled to participate in its proceedings, and vote upon all questions that may come before the Association. Associate members shall be entitled to participate in discussions of questions before the Association. Sustaining members shall be entitled to participate in discussions, and to vote upon questions before the Association.

ARTICLE III

Duties of Officers

SECTION 1. The President shall be the executive head of the Association He shall preside at all meetings of the Association, and shall appoint an Auditing Committee and all temporary committees.

SEC. 2. In the absence of the President the Vice-President shall act in his place and stead, *provided*, that in the absence of both the President and Vice-President the Executive Committee shall immediately elect one of its members to perform the duties of the President.

SEC. 3. The Secretary shall keep the records and minutes of the Association. He shall draw all orders upon the Treasurer for the payment of money. He shall serve all notices and perform all duties necessary to the proper conduct of the business affairs of the Association, and shall perform such additional duties as may be assigned to him by the Board of Directors. He shall make written report annually of the work of the Association, and shall make such special written reports to the Board of Directors as they may require from time to time.

SEC. 4. The Treasurer shall be the custodian of the funds of the Association. He shall pay all orders for money duly signed by the Secretary. He shall make a written report annually to the Association, accounting for all funds received and disbursed. If the Treasurer shall for good and sufficient reason be temporarily unable at any time to perform the duties of his office, he shall so inform the chairman of the Executive Committee, who shall, with the concurrence of two other members of said committee, designate one of their members to perform the duties of Treasurer, until such time as the Treasurer shall resume his duties and so inform the chairman of the Executive Committee.

SEC. 5. The Organizer shall perform such duties as are assigned to him by the Board of Directors.

SEC. 6. The Board of Directors shall at its first meeting and annually thereafter elect a chairman. The Board shall have custody of all property of the Association; shall have charge of the financial affairs of the Association; shall provide ways and means for its expenses, shall appoint all regular committees and all officers not otherwise provided for, shall have supervision and control over all work carried on by the Association and its officers, and shall fill all vacancies in its own membership and among the officers of the Association between the meetings of the Association.

ARTICLE IV

Duties of Committees

SECTION 1. The Executive Committee shall act for the Board of Directors and exercise all the powers of said Board in the interim between the meetings of said Board, and shall report quarterly to the Board the condition of the Association and its work.

SEC. 2. The Committee on Finance shall provide for the raising of funds to carry on the work of the Association and shall have supervision over the financial affairs of the Association.

SEC. 3. The Committee on Membership shall deal with all questions relating to membership in the Association, and shall take such steps as it may deem advisable for increasing the membership of the Association.

SEC. 4. The Auditing Committee shall audit and review the reports of the Secretary and the Treasurer.

ARTICLE V

Meetings

SECTION 1. Regular meetings of the Association shall be held annually at such time and place as the Board of Directors may determine. Special meetings may be called by the Board of Directors, or by two-thirds of the regular members of the Association.

SEC. 2. The Board of Directors may fix the time and place of its meetings, provided that it shall meet at least once in each year.

SEC. 3. The Executive Committee shall fix the time and place of its meetings, provided that it shall meet at least once in each three months.

ARTICLE VI

Quorums

SECTION 1. A quorum of the Association shall consist of fifty members who shall be present in person.

SEC. 2. A quorum of the Board of Directors shall consist of five members who shall be present in person.

SEC. 3. A quorum of the Executive Committee shall consist of a majority of its members.

ARTICLE VII

Amendments

SECTION. 1. The By-Laws of this Association may be altered or amended by the Board of Directors, at their discretion, *provided*, that such By-Laws shall not conflict with the provisions of the Constitution.

Working Plan

In addition to its volunteer non-paid workers, the Association has a small corps of thoroughly competent salaried men whose duties are: to appear before State legislative committees, on invitation, and give advice on pending road legislation; to address conventions and local meetings in advocacy of needed reforms in road improvement; to organize and prepare working plans for local road improvement associations; to prepare articles of educational and news value for the use of the press in arousing, stimulating and directing public sentiment.

The Association is continually assembling data concerning the progress and status of the road movement, embracing road legisation, bond issues, mileage and cost of roads, organization work, etc.

Annually the Association holds a Road Congress for the discussion of problems of road construction, maintenance and administration, and for correlation and coördination of the work conducted by the various State and Interstate road organizations.

The Association coöperates with railroad companies and the national government in educational campaigns through the medium of "Good Roads Trains." Under this plan the government provides a miniature working exhibit illustrating types of roads and methods of construction, a stereopticon with slides, and assigns one or more demonstrators to accompany the train at government expense for salary, travel and subsistence. The Association at its own expense provides an experienced organizer who organizes in each county traversed, a practical association and suggests a constitution and a working plan for it. The plan in general is as follows:

It is suggested that as soon as the organization has been completed, a constitution and by-laws adopted and permanent officers elected, working committees should be selected whose distribution of duties and responsibilities should be somewhat as follows:

(a) *Committee on Road Administration.*—This committee should ascertain the laws upon which the road administration of the county or locality are based, the personnel of the official organization selected to carry out such laws, the revenues available for road purposes, how obtained, how expended, and what system of accounting and recording is followed. It should recommend needed reforms in road laws, organization and administration; it should ascertain the various sources of revenue and plans for raising additional revenues; and should eventually formulate its findings into a report containing recommendations for the future financing of road work.

(b) *Committee on Road Materials.*—This committee should ascertain the location, character, quantity and availability of all road materials in the county. This work can be much facilitated by coöperation with the Office of Public Roads of the United States Department of Agriculture, which makes analyses and tests of road materials free of charge, whereby the kind and quality of road building material can be definitely ascertained. The committee should also make a study of transportation facilities for road materials, and work out plans whereby the county or locality can obtain the best materials in the easiest and most economical manner. They might consider the advisability of the purchase of quarries and gravel pits, the arrangement of special rates with the railroad companies, the preparation of the materials by county prisoners, etc.

(c) *Committee on Road Construction and Maintenance.*—This committee should ascertain the mileage of public roads, and classify them according to amount and importance of traffic, ascertaining the improvement that is necessary and the probable cost; draw up a general plan for the gradual improvement of all the county roads along definite, intelligent lines, according to the means available; obtain data bearing upon all phases of road construction; and should coöperate closely with the committee on road materials in drawing up its recommendations as to the kind and amount of road construction to be undertaken. It should make a close study of road maintenance, with a view to introducing the best and most economical methods for maintaining the roads. It should look into the relative merits of the various kinds of road equipment, and aid the county authorities by information and advice in securing the necessary equipment.

(d) *Committee on Earth Roads.*—This committee should devise ways and means for stimulating interest in the road drag, and should endeavor to bring about the general use of this simple little implement. Records could be kept of the number of drags in use, and the mileage of roads regularly dragged as the result of the work of the committee. Contests could be inaugurated and publicity given the work, so that the interest might become widespread, and practical results accomplished.

The Association plans to issue instructive publications from time to time, in addition to the Year Book, including the papers read and proceedings had at the Annual Road Congress.

The foregoing specific examples indicate *in part* the *methods* by which the Association is endeavoring to carry out its purposes. New methods and new lines of activity frequently develop and are utilized as far as practicable.

Officers

President

MR. L. W. PAGE
Director, U. S. Office of Public Roads

Vice-President

MR. W. W. FINLEY
President, Southern Railway Company

Secretary and Editor

MR. J. E. PENNYBACKER, JR.

Treasurer

MR. LEE MCCLUNG
Former Treasurer of the United States

Chairman, Board of Directors

MR. JAMES S. HARLAN
Member Inter-State Commerce Commission

Organizer and Field Secretary

MR. CHARLES P. LIGHT

Board of Directors

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PHILIP T. COLGROVE, President, Michigan State Good Roads Association, Hastings, Michigan
GEORGE W. COOLEY, State Highway Engineer, St. Paul, Minnesota
GEORGE C. DIEHL, Chairman, Good Roads Board, A. A. A.
W. W. FINLEY, President, Southern Railway Company
JOHN M. GOODELL, Former Editor, *Engineering Record*
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BRYAN LATHROP, Member, Lincoln Park Commission
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Alfred Noble, Past President, American Society of Civil Engineers
Thomas G. Norris, President, Arizona Good Roads Association
Logan Waller Page, Director, United States Office of Public Roads
Walter H. Page, Editor, *World's Work*
Lewis W. Parker, President, South Carolina Cotton Manufacturers Association
Dr. Joseph Hyde Pratt, State Geologist of North Carolina
A. G. Spalding, Member, San Diego Highway Commission, California
Jesse Taylor, President, Ohio Good Roads Federation
Leonard Tufts, President, Capital Highway Association
B. F. Yoakum, Chairman, Frisco Lines

Honorary Member

M. Jean de Pulligny, Director of the French Mission of Engineers in the United States

Sustaining Members

Arents, Miss Grace E.
Association American Portland Cement Manufacturers
Atlantic City Hotel Men's Association
Barber Asphalt Paving Company
Barrett Manufacturing Company
Beatty, W. T.
Butterworth, William
Canada Cement Company, Ltd.
Carnegie, Andrew
Case, J. I., Threshing Machine Company
Chicago Portland Cement Company
Cleveland Stone Company, The
Cullinan, H. J.
Cullinan, J. S.
Davis, Charles Henry
Duff, John J.
du Pont, Coleman
du Pont, Pierre S.
El Paso and Southwestern System
Harlan, Hon. James S.
Illinois Central Railroad Company
International Clay Products Bureau
International Harvester Company
Jones, Joseph W.
Lathrop, Bryan
Lapham, J. H.
Laughlin, James, Jr.
Long, R. A.
Mackall, W. W.
National Cash Register Company, The
National Paving Brick Manufacturers Association
Nelson, Charles N.
Noble, Alfred
Oglebay, Hon. Earl W.
Robeson Process Company
Ryan, Thomas F.
Schiller, William B.
Seaboard Air Line Railway
Sewall, Arthur W.
Solvay Process Company, The
Standard Oil Company of New York
Sun Company
Thompson, Col. Robert M.
Tiffany, Louis C.
Tufts, Leonard
United States Asphalt Refining Company, The
Universal Portland Cement Company
Warner Company, Charles
Warren Brothers Company
Watson Wagon Company
Whitmer, Robert F.

Regular Members

Abbott, D. E.
Abeling, Otto
Abney, William O.
Achelis, Fritz
Adams, Byron S.
Adams, Joseph
Adams, J. D., & Company
Adams, Mrs. M. W.
Adger, John B.
Affleck, B. F.
Ahlbrandt, G. F.
Ailes, Milton E.
Albright, J. J.
Alderson, Charles M.
Alexander, Charles B.
Alexander, Herbert L.
Alexandre, Mrs. John E.
Allen, Benjamin
Allen, George W. H.
Allen, T. Warren
Alliance Clay Product Company
Allport, R. B.
Alsdorf, W. A.
Alsen's American Portland Cement Works
Alton Brick Company
American Hoist & Derrick Company
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Anderson, Gen. Clifford L.
Anderson, David G.
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Anderson, Mrs. Edward L.
Anderson, Frank Bartow
Anderson, Henry B.
Anderson, Henry W.
Anderson, Joseph L.
Anderson, Patrick H.
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Anthony, A. G., & Son
Archbald, Joseph A.
Asheville Motor Club
Aston, William H.
Astor, W. Vincent
Atha, Howard D.
Atherton, Peter Lee
Atkinson, George
Atkinson, H. M.
Atkinson, S. T.
Atlas Portland Cement Company, The
Atwater, A. A.
Auburn Wagon Company
Autry, James L.
Avis, S. B.
Ayres, Ernest F.
Babb, Frank H.
Babcock, F. R.
Bacon, Miss E. S.
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Bailey, Benjamin F.
Baker, Col. George C.
Baker, M. W.
Ball, James F.
Barney, Charles D.
Barns, Glenn F.
Barr, J. H.
Barrett, Robert
Barron, James S.
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Bartol, George E.
Batchelder, A. G.
Bates, Mrs. A. E.
Bates, Adelmer M.
Bates, B. L. M.
Bates, Onward
Batt, Ludwig
Bauer, Jacob L.
Baughman, E. A.
Baumgardner, Charles L.
Bayliss, Charles W.
Beall, John S.
Beall, Wylie W.
Beasley, Col. W. F.
Beatty, S. F.
Beatty, W. T.
Beck, Raymond
Bedford, Thomas A.
Beecroft, David
Beeghley, Lloyd
Beer, Dr. Oscar B.
Beers, W. D.
Behrens, H. F.
Beidler, Francis
Belden, James M.
Bell, A. S.
Bell, Albert T.
Bell, Alfred W.
Belvin, Preston
Bennett, Louis
Bennett, William R.
Bensel, John A.
Bentley, Cyrus
Berquist, J. G.
Bernheim, Robert B.
Besley, Mrs. Charles Howard
Bigelow, Edward M.
Big Four Clay Company, The
Biggs, Dr. Hermann M.
Billings, S. O.
Bingham, Clarence A.

Bixby, Gen. W. H.
Black, Mrs. Elmer
Black, John A.
Black, Gen. John C.
Blackistone, Z. D.
Blair, C. C.
Blair, Mrs. William
Blair, Will P.
Blake, T. Whitney
Blaker, G. H.
Blanchard, Arthur H.
Blanchard, C. A.
Bloch, Jesse A.
Blodgett Construction Company
Bloyd, J. A.
Board of Commerce of Red Bank
Board of Park Commissioners, Covington.
Bodine, Samuel T.
Bodley, William King
Bond, S. N.
Bonham, H. L.
Boocock, Murray
Boury, Louis J.
Bowen, Henry S.
Bowers, George M.
Bowlby, Henry L.
Bowman, E. L.
Bowman, Mrs. George F.
Bowman, H. A.
Bowman, Thomas B.
Bowne, Mrs. Samuel W.
Boyd, D. C.
Boyd, John Y.
Boyer, Edward D.
Boyeson, A. E.
Boykin, L. E.
Boynton, Jesse L.
Brackett, Winslow M.
Bradley, Mrs. Charles
Bradt, S. E.
Brady, Samuel D.
Branch, M. C.
Brantley, William G., M. C.
Brast, Edward
Breckinridge, Alexander N.
Breese, W. E., Jr.
Bregenzer, C. E.
Britton, Roy F.
Brodrick, W. S.
Brooks, J. Arthur
Brooks, James C.
Brooks, Peter C.
Brooks, Mrs. Reginald
Brooks, R. E.
Brown, Charles C.
Brown, Eugene L.
Brown, Frank L.
Brown, George Warren
Brown, Lathrop
Brown, L. G.
Brown, Martin L.
Brown, W. C.
Brown, William G., Jr., M. C.
Brown, Wilson R.
Browne, A. B.
Browning, J. Hull
Browning, William H.
Brownson, Rear Admiral Willard H.
Bruce, Frederick
Brune, Herbert M.
Bryan, Jonathan
Bryan, John Stewart
Bryan, T. Edward
Bryant, Hughes
Buck, Church
Buckingham, John R.
Burch Plow Works Company, The
Burgevin, Julius E.
Burlew, Gen. N. S.
Burnham, Mrs. J. A.
Burnley, J. G.
Burrell, B. H.
Bush, B. F.
Bush, S. P.
Butler, Charles Henry
Byrd, H. F.
Byrd, William

Cabell, Col. Henry C.
Caley, Frederick H.
Calkins, R. M.
Cameron, Col. Bennehan
Campbell, George H.
Campbell, Judge I. K.
Cammann, Miss Kate L.
Campbell, Charles W.
Cannon, F. A.
Cannon, Kirtley
Cannon, Thomas L.
Capito, Charles
Carey, Arthur A.
Carmichael, Otto
Carpenter, George Boone
Carr, Gen. Julian S.
Carter, Dr. C. Shirley
Carter, Gale Augustus
Carter, Thomas N.
Carter, William P.
Cartwright, W. Y.
Cary, T. A.
Catlin, Theron E.
Chalfant, Miss Isabella C.

Chalmers Motor Company of Missouri
Chamber of Commerce, Birmingham, Ala.
Chamber of Commerce, San Diego, Calif.
Chapin, R. D.
Chaplin, B. M.
Chapman, Floyd S.
Chase, L. C., & Company
Cherry, W. I.
Chester, F. J.
Chester County Road Supervisors Association
Childs, Richard T.
Chilton, Maj. Joseph E.
Chilton, Hon. William E., U. S. S.
Chorpening, George B.
Chubb, Percy
Clack, James M.
Clark, C. M.
Clark, Edward S.
Clark, Herbert V.
Clark, James B.
Clark, Dr. L. H.
Clark, T. R.
Clarke, Vincent B.
Clarkson, J. D.
Classen, Charles H.
Claussen, Oscar
Clay, Buckner
Clemans, W. M.
Clifford, R. J.
Clohan, Alexander
Clover, Rear Admiral Richardson
Clyde, William P.
Cobb, Lamar
Cobb, Murray A.
Cochrane, J.
Coffman, C. C.
Cohen, Samuel
Coke, John A.
Colcord, E. C.
Cole, Maj. H. G.
Colgrove, P. T.
Collier, Robert J.
Commonwealth Steel Company
Compton, R. Keith
Concrete Form & Engine Company
Concrete-Cement Age
Connable, Frank L.
Connell, William H.
Conover, Charles H.
Conoway, Waitman H.
Conrad, O. A.
Converse, Frederick S.
Cook, James H.
Cook, Joe R.
Cooke, C. B.
Cooley, George W.
Cooper, C. J.
Cornell, John E.
Cornwell, John J.
Corpus Christi Commercial Club
Corthell, Elmer L.
Cottman, J. H.
Couch, George S.
Couch, George S. Jr.,
Courtney, Dr. David H.
Cox, Hon. James M.
Coxey, Gen. J. S.
Coyle & Richardson
Craig, Benjamin L.
Crane, C. A.
Cranford, J. H.
Cranford, Percy
Cranmer, W. H. H.
Crescent Portland Cement Company
Cressy, Walter
Crook, Leslie B.
Crosby, W. W.
Culp, J. M.
Cumming, A. Gordon
Cunningham, A. M. T.
Cuppett, D. E.
Curtis, W. E.
Cushman, Dr. Allerton S.

Dalton, H. G.
Dameron, Edward Caswell
Dana, Charles S.
Dana, S. F.
Darlington, N. D.
Darst, John Sherman
Davidson, L. D.
Davidson, W. C.
Davis, Charles Henry
Davis, Hon. Henry G.
Davis, John T.
Davis, John W., M. C.
Davison, F. B.
Dawson, J. W.
Dean, Mrs. S. Ella Wood
Dean, Frank J.
Dearborn, George S.
Dearborn Drug & Chemical Works
Decker, R. W.
Deeds, D. D.
Deeds, Mrs. D. D.
DeGraw, Hon. P. V.
Delano, F. A.
Demming, Col. Henry C.
Denham, S. C.

Denys, Rev. F. Ward
Dew, Charles
Dewey, Albert B.
Dewey Portland Cement Company
Dickinson, John Q.
Dickinson, John W., Jr.
Dickinson, W. W.
Diehl, George C.
Dille, Thomas Ray
Dillon, Charles W.
Dixie Portland Cement Company
Dixon, R. H.
Dixon, William H.
Doane, James May
Dodge, A. Douglas
Dodge, C. P.
Donahue, J. E.
Donelson, J. E.
Donley, Edward G.
Donley, William McClary
Dorr, Charles P.
Dougherty, Rev. George A.
Douglas, E. B.
Dow, A. W.
Dow, Richard S.
Downing, H. H.
Downing, J. F.
Doyle, Harry S.
Draney, Joseph R.
Dudley, C. H.
Dulles, William
Dunlop, R. A.
Dunn, W. R.
Dunning, A. B.
du Pont, Irenee
du Pont, Lammot
Durbin, Charles R.
Dye, William Holton

Easby, William, Jr.
Eastburn, Charles T.
Easton, E. G.
Edison, Thomas A.
Edison Portland Cement Company
Edmiston, Andrew
Edson, J. J.
Edwards, J. H.
Edwards, William Seymour
Egleston, Howard
Ehlers, V. M.
Eldridge, M. O.
Elkins, Blaine
Elkins, Davis
Elkins, George W.
Elkins, Mrs. Hallie D.
Ellerson, A. R.
Elliott, B. K., Company
Ellis, Fred E.
Ellis, W. Dixon
Elton, John P.
Emery, Mrs. Thomas J.
Emmons, Arthur B.
Eno, William P.
Engineering & Contracting
Enslow, Frank B.
Equipment Company, The
Essex County Park Commission
Evans, Walter A.
Ewald, Dr. Louis A.
Ewing, F. G.

Fallis, W. S.
Fairmont Chamber of Commerce
Farnam, Henry W.
Farnam, William W.
Farquhar, A. B., Company, Ltd.
Farrar, F. E.
Farris, John
Farris, William
Faulkner, Hon. Charles J.
Faust, H. K.
Fay, F. T.
Fegenbush, Chas. J.
Felton, S. M.
Fenner, H. N.
Field, Barker & Underwood, Inc.
Filbert, Richard Y.
Filbert Paving & Construction Company
Finley, W. W.
First National Bank, Huntington, W. Va.
Fisher, Charles Robert
Fisher, Henry
Fitz-Hugh, Curtis
Flagg, Ernest
Flanigan, P. & Sons
Fleming, Hon. A. Brooks
Fleming, A. Howard
Fleming, Fred W.
Fletcher, Austin B.
Flickwir, David W.
Flinn, George H.
Folger, Lee A.
Follett, A. D.
Foltz, Maj. Frederick S.
Ford, Frank T.
Foster, Samuel D.
Foster Motor Car Company
Fout, Maj. J. H.
Fownes, H. C.
Fox, Fred J.
Frame, E. C.
Francis, M. J.

Francis, William M.
Fraser, Miss J. K.
Frederick Hotel Company
French, Samuel H., & Company
Fuchs, George
Fuller, Almon H.
Fuller, Frank L.
Fulweiler, Walter Herbert

Gaff, T. T.
Gaffey, John A.
Gaines, Clement C.
Gallagher, Austin
Gallaher, John T.
Gardiner, Asa Bird, Jr.
Garlick, H. M.
Garneau, Joseph
Garner, James A.
Gartland, John J., Jr.
Gaskill, Edwin A.
Gaston, Miss Sarah H.
Gates, E. P.
Gay, Louis W.
Gay, W. O.
Gaylord, W. A.
Gaynor, James L.
Gazley, R. J.
Gearhart, W. S.
Gerstell, A. F.
Gilbert, Hugh C.
Gilbert, Seymour P.
Gillespie, John S.
Gillette, Charles F.
Glasscock, Gov. William E.
Glens Falls Portland Cement Company
Glover, A. M.
Glover, Charles C.
Godwin, W. S.
Goe, R. T.
Goff, Guy D.
Golsan, H. L.
Good, D. M.
Goodell, John M.
Goodfellow, Hugh
Good Roads Association, Lafayette, La.
Goodykoontz, Wells
Gordon, M. E.
Gordon, William F.
Gorrill, Mrs. Charles H.
Grant, E. M.
Grant, John W.
Grasselli, C. A.
Graves, H. S.
Gray, R. S.
Greble, Lieut.-Col. Edward St. J.
Green, Henry S.
Greene, Gen. Francis V.
Greene, W. Maxwell
Greenlee, C. F.
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Grey, Norman
Griffith, C. J.
Griffith, D. J.
Grigg, Jerome B.
Grosscup, Col. Fred Paul
Grovall, William H.
Grove, William J.
Groves, E. W.
Grundy, Barton H.
Grush, W. L.
Gustafson, E. N.
Guy, William E.

Hackney, John W.
Hadley, Howard D.
Haggerty, G. W.
Hague, William
Hahn, E. J.
Hall, A. Acton
Hammond, John Hays
Hammond Fire Brick Company
Hamilton, Dr. M. F.
Hancher, Charles N.
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